







QL
461
E831
v. 74
Ent.

ENTOMOLOGICAL NEWS

VOLUME LXXIV, 1963

R. G. SCHMIEDER, EDITOR

EDITORIAL STAFF

J. A. G. REHN

M. E. PHILLIPS

H. J. GRANT, JR.

H. W. ALLEN

S. S. ROBACK

PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
THE ACADEMY OF NATURAL SCIENCES
PHILADELPHIA, PENNSYLVANIA, U. S. A.
1963



The numbers of ENTOMOLOGICAL NEWS for 1963 were mailed at the Post Office at Lancaster, Pa., as follows:

No. 1—January	January 16, 1963
No. 2—February	February 5, 1963
No. 3—March	March 13, 1963
No. 4—April	April 5, 1963
No. 5—May	May 3, 1963
No. 6—June	June 18, 1963
No. 7—July	July 3, 1963
No. 8—October	October 2, 1963
No. 9—November	November 1, 1963

The date of mailing the December 1963 number will be announced on the last page of the issue for January, 1964.

Insects

ENTOMOLOGICAL NEWS

JANUARY 1963

Vol. LXXIV

No. 1

CONTENTS

Krombein—Behavior of the Floridian mantid <i>Gonatista</i>	1
Higgins and Woolley—New species of moss mites	3
Scott—Collembola of New Mexico, IX.	9
Porter—Rediscovery of <i>Listrognathus nubilipennis</i>	19
Kurczewski—Biological notes on <i>Campsomeris</i>	21
Personal	24
Moxey—Two new species of Coleoptera (Scarab., Coprini)	24
Review—The mosquitoes of the South Pacific	26

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.

AND

1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.



ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$4.35	\$6.96	\$10.88	\$4.74
100	5.21	8.26	13.05	6.48
Add'l 100	1.74	2.60	4.33	3.48

Plates printed one side: First 50, \$3.47; Additional 100's, \$2.61.

Transportation charges will be extra.



1



2



3



4

ENTOMOLOGICAL NEWS

VOL. LXXIV

JANUARY, 1963

No. 1

Behavioral Notes on a Floridian Mantid, *Gonatista grisea* (F.) (Orthoptera, Mantidae)

KARL V. KROMBEIN, Entomology Research Division,
Agr. Res. Serv., U.S.D.A., Washington, D. C.

During a recent period of residence at the Archbold Biological Station, Lake Placid, Florida, June 17 to July 5, 1962, I had an opportunity to make a few interesting observations on a nymph of the grizzled mantid, *Gonatista grisea* (Fabricius). This is one of the more bizarre-appearing Floridian insects because its flattened form and mottled gray color cause it to resemble a lichen while it is in its customary resting position on a similarly colored tree trunk.

My attention was first drawn on June 19 to a *Gonatista* nymph, 25 mm long, while I was observing the behavior of some wasps which were nesting in borings in wooden traps. This bundle of traps was suspended from a limb of a small scrub hickory, *Hicoria floridana*, about 2.5 meters in height. The nymph was in typical resting position (Figs. 1, 3), tightly appressed to the smooth mottled gray bark of the hickory trunk about a meter above the ground with its head downward, its forelegs folded alongside the pronotum, and its mid and hind

EXPLANATION OF PLATE

FIGS. 1-4, *Gonatista grisea* (F.), nymph

Figs. 1 and 3, resting position during daytime, June 20. Figs. 2 and 4, hunting posture at dusk, June 23. Note that mantid is never more than a few cm from epiphyte on hickory trunk. All photographs by the author with electronic flash: Figs. 1 and 2, $\times 0.6$; Figs. 3 and 4, $\times 1.0$.

legs close to the bark.* The nymph rested motionless during the daytime and always head downward. However, it was quite alert and would scuttle rapidly away like a squirrel, either upward, downward or sideways, but always in a direction opposite to that from which a teasing finger was advanced. Rehn and Hebard (1914, p. 383) commented some years ago on this rapid, scuttling escape reaction. Crane (1952, p. 264) also found this type of escape reaction in a species of the closely related genus *Liturgousa* in Trinidad.

At dusk, about 7:30 PM Standard Time, this *Gonatista* assumed the hunting posture (Figs. 2, 4). In this position it faced head upward with the fore part of the body raised slightly off the bark, the raptorial forelegs in a "ready" position, and the mid and hind legs more raised off the bark. I observed this hunting posture on several succeeding evenings when I checked the traps.

A remarkable facet of the mantid's behavior was its constancy in maintaining a resting position on the same few square centimeters of tree trunk day after day. On my last observation on July 4 the nymph was in the same spot in which I discovered it 16 days earlier. Dr. L. J. Brass, Station botanist, was unable to find this mantid on August 19, when he examined the tree trunk at my request. By that time it may have matured and wandered off, or perhaps it was eaten by some predator.

REFERENCES

- CRANE, J. 1952. A comparative study of innate behavior in Trinidad mantids. *Zoologica* 37: 259-293, 2 text figs., 10 pls.
REHN, J. A. G. and M. HEBARD. 1914. On the Orthoptera found on the Florida Keys and in extreme southern Florida. II. *Proc. Acad. Nat. Sci. Phila.* 66: 373-412, 7 figs.

* Another nymph was collected from the trunk of a scrub hickory a few meters away. This second nymph and the photographs are the bases for specific identification by A. B. Gurney, Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture.

New Species of Moss Mites of the Genus *Eupterotegeus* from the Western United States (Oribatei: Cepheidae)

HAROLD G. HIGGINS² and TYLER A. WOOLLEY³

During recent studies on the cepheid mites of the western United States, two undescribed species of *Eupterotegeus* Berlese 1908, were discovered among collections of moss mites from Colorado, Utah, and Washington. These new species are described below.

Eupterotegeus rostratus, n. sp. (Figs. 1, 2)

Diagnosis: Rostrum flat, with small median spine and rounded corners subequal in length; lamellae large, projecting over and beyond rostrum, with broadly rounded lateral margins; dorsum of hysterosoma covered with circular pits.

Description: Dark reddish-brown color; propodosoma about a third as long as hysterosoma and approximately as wide as long; rostrum flattened, translucent, with small median spine in anterior margin and rounded corners of about equal length, a faintly sclerotized transverse line crossing rostrum posterior to insertion level of rostral hairs; rostral hairs simple, nearly as long as width of rostral tip, inserted in rounded antero-lateral corners of rostrum; a faint, sclerotized channel extending from these insertions distally and medially; lamellae nearly four times as long as wide, with nearly parallel margins, except for distal tips, covering lateral margins of propodosoma, anterior margins incurved, median dorsal surface of lamellae with small, longitudinal carina extending from pseudostigmata to base of insertions of lamellar hairs, surface of lamellae pitted; lamellar hairs simple, as long as width of lamella at level of translamella, decurved and incurved, extended beyond anterior tip of lamellae, inserted in anterolateral edge; translamella interrupted medially;

¹ Research supported by National Science Foundation.

² University of Utah, Salt Lake City, Utah.

³ Colorado State University, Fort Collins, Colorado.

interlamellar hairs simple, weak, inserted near medial margin of lamellae at level of pseudostigmata; pseudostigmata prominent, heavy, vase-shaped, with roughened edges, as long as width of lamella, aperture one-fourth as wide as lamella, directed antero-laterad, internal spiral lining pronounced; pseudostigmatic organ shorter than distance between pseudostigmata, bent sharply at aperture of pseudostigmata, pedicel smooth, tapered to a slightly swollen, finely setose head; tectopodia I moderately heavy, directed forward, roughly pitted; tectopodia II about one-half as large as tectopodia I; exobothridial hairs not seen in type specimen; posterior surface with several chitinous knobs near dorsosejugal suture.

Hysterosoma round, with numerous circular pits in integument, antero-lateral pteromorphs roughened, projected beyond level of dorsosejugal suture; dorsosejugal suture with straight anterior margin, indented near antero-lateral corners; ten pairs of marginal dorsal setae, each borne on a small tubercle as shown in Figure 1; numerous areae porosae near medial-posterior margin of hysterosoma.

Camerostome egg-shaped, mentum weakly sclerotized on anterior margin, heavily sclerotized posteriorly, with lateral internal condyles near posterior border; apodemata I curved anteriorly near lateral edge at level of tectopodia I; ventral sclerotization and setae as shown in Figure 2; genital opening round, located between apodemata IV, each cover with six, short, fine setae along medial margin; anal aperture trapezoidal, a third larger than genital opening, with a short, flattened preanal piece; each anal cover with two setae, a:1 inserted in anterior third of cover, a:2 inserted in posterior fourth of cover; four adanal setae, ada:1 and ada:2 near posterior margin of anal aperture, each inserted in raised tubercle; ada:3 and ada:4 without tubercles, ada:3 lateral to widest part of cover, ada:4 near anterior end of anal aperture, all adanal setae inserted in margin of sclerotized perianal ring surrounding anal aperture, a few circular depressions in margin of band.

Entire body and legs covered with a thickened cerotegument. Legs with only slightly heterotridactylous tarsi.

Length $612\ \mu$ including lamellae, hysterosoma $570\ \mu$; width $360\ \mu$.

The holotype and five paratype specimens were collected from Bennett Creek Camp Ground, Pingree Park, Larimer County, COLORADO, 14 August 1954 by T. A. Woolley; five specimens from Chinney Park Camp, Medicine Bow National Forest, Wyoming, 16 August 1958 by T. A. Woolley; two specimens from Neah Bay, Washington, 23 August 1956, by H. and M. Higgins; one specimen collected from Toponas Creek Camp Ground, Gore Pass, Colorado 26 July 1956 by H. and M. Higgins. The holotype and one paratype will be deposited in the U. S. National Museum.

Eupterotegeus spinatus, n. sp. (Figs. 3, 4)

Diagnosis: Similar to *E. rostratus* but with a distinct trans-lamella and a strong, median translamellar spine between lamellae; dorsal integument of hysterosoma roughly reticulate.

Description: Reddish-brown in color; propodosoma triangular in outline, about as wide as long, with several sclerotized knobs near dorsosejugal suture; rostrum only partially visible from above, the corners projecting from beneath translamellar spine, rostral hairs about as long as width of rostrum, curved, inserted in corners of rostrum; lamellae half as broad as width of propodosoma, lying over lateral margins of propodosoma, with straight medial margins and undulating lateral margins, anterior cusps twice as long as interlamellar spine, projected anteriorly beyond rostrum, tip broadly rounded laterally, culminated in a sharp point, a longitudinal sclerotized carina extending from base of lamellar hairs to median edge of lamellae posterior to translamella; lamellar hairs short, simple, decurved, inserted in anterior edge of cusp, diameter of insertion areolae larger than diameter of hairs, coalesced with longitudinal sclerotized carina on dorsum of lamellae; translamella extended between lamellae at level of distal third of lamellae, with a stout, slightly curved median spine about half as long as lamellar cusp, extended beyond tip of rostrum; interlamellar hairs short, simple, curved, inserted about their lengths mediad of lamellae at level of ante-

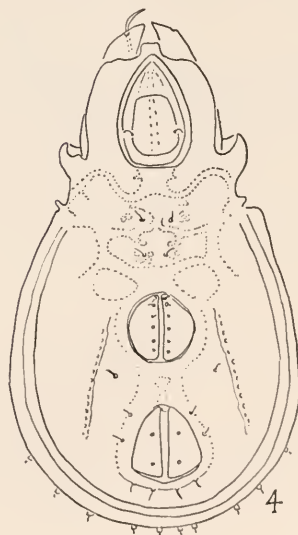
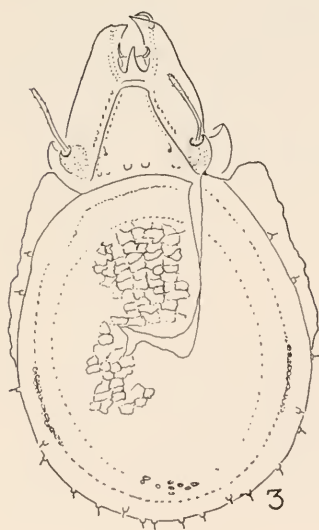
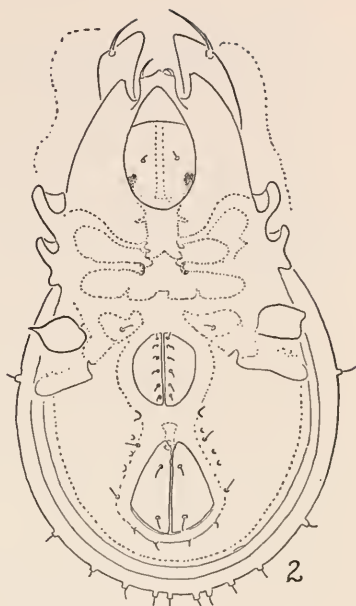
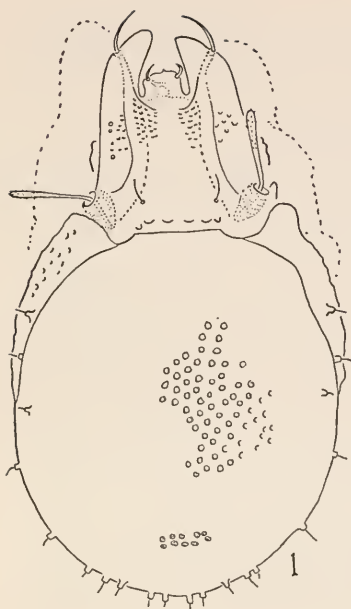
rior margin of pseudostigmata; pseudostigmata heavily sclerotized, vase-shaped, with roughened aperture and prominent internal sclerotization; pseudostigmatic organs shorter than the distance between pseudostigmata, about three times as long as lamellar hairs, of fairly uniform diameter, distal tip finely setose; tectopodia I large, directed anteriorly at level of pseudostigmata; no exobothridial hairs observed in type specimen.

Hysterosoma oval, with roughened antero-lateral pteromorphs projected anteriorly beyond level of rounded dorsosejugal suture; surface roughly reticulate, with a distinct rectangular pattern; ten pairs of short dorsal, marginal setae, each seta borne on a raised tubercle; numerous areae porosae around lateral margins and posteriorly as shown in Figure 3.

Camerostome egg-shaped, with heavy, sclerotized mentum extended two-thirds the length anteriorly; camerostomal setae as seen in Figure 4; apodemata strongly sclerotized, as shown in Figure 4; apodemata IV extended to sclerotized, perigenital ring; genital opening broadly trapezoidal, two-thirds its length anterior to anal aperture, each genital cover with six hairs, g:1 and g:2 close together near anterior margin of cover, g:3, g:4, g:5, g:6 subequally spaced along median margin; anal aperture about same size as genital aperture, anal plates narrower anteriorly, each cover with two setae; preanal piece prominent, extended anteriorly two-thirds the distance between genital and anal openings; aggenital seta inserted remote from genital aperture, but at level of anterior end of preanal piece; four pairs of adanal setae, ada:1 and ada:2 inserted posterior to anal opening, ada:3 and ada:4 inserted laterad of cover, ada:3 posterior to level of a:1 and ada:4 anterior to level of a:1, adanal setae inserted in sclerotized perianal ring which is continuous with sclerotized perigenital ring; a sclerotized longitudinal ridge in ventral plate lateral to genital and anal apertures.

EXPLANATIONS OF FIGURES

- FIG. 1. *Eupterotegeus rostratus*, n. sp., from the dorsal aspect.
FIG. 2. *Eupterotegeus rostratus*, n. sp., from the ventral aspect.
FIG. 3. *Eupterotegeus spinatus*, n. sp., from the dorsal aspect.
FIG. 4. *Eupterotegeus spinatus*, n. sp., from the ventral aspect.



Body and legs covered with a thick cerotegument; legs short, stout, with heterotridactylous tarsi; legs I and II reaching beyond anterior tip of lamellae.

Length to end of lamellae 594 μ ; length to end of rostrum 558 μ , hysterosoma 396 μ ; width 348 μ .

The type specimen was collected by H. Higgins from Diamond Fork Canyon, UTAH, 17 June 1956. This specimen will be deposited in the U. S. National Museum.

Discussion: The two new species of *Eupterotegeus* described above differ in the shape of the lamellae from *Eupterotegeus ornatissimus* (Berlese), 1908, as figured by Balogh (1961). In the latter the lamellae are rather narrow toward the distal half and with "shoe-shaped" apices, while in both *E. spinatus*, n. sp., and *E. rostratus*, n. sp., the lamellae are broader, with parallel sides, antero-lateral margins broadly rounded, and somewhat translucent cusps. The general shape of the body, the heavy, vase-shaped pseudostigmata, long pseudostigmatic organs and the peripheral dorsal hysterosomal setae are characteristics which justify, in the writers' opinions, the placement of these species in the genus *Eupterotegeus*.

LITERATURE CITED

- BALOGH, J. 1961. Identification Keys of World Oribatid (Acari) Families and Genera. *Acta Zool.* 7(3-4): 243-344.
- BERLESE, A. 1908. Elenco di Generi e Specie Nuove di Acari. *Redia* 5: 1-15.
- . 1910. Acari Nuovi. *Redia* 6(2): 200-234.
- . 1916. Centuria prima di Acari Nuovi. *Redia* 12(1-2): 48-67.

The Collembola of New Mexico. IX. Entomobryinae: Drepanura, Entomobryoides, Isotobryoides, Sinella ^{1, 2}

HAROLD GEORGE SCOTT ³

Prior to the species recorded in this part, only one species of Entomobryinae is recorded from New Mexico: *Entomobryoides guthriei* (Mills, 1934) from Taos County by Christiansen (1958). Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Subfamily ENTOMOBRYINAE Schaffer, 1896

Body elongate, not subglobose; pseudocelli absent; mouth-parts chewing; Ant III not several times as long as IV; antenna longer than head; post-antennal organ absent; prothorax reduced, naked dorsally; body segments never ankylosed; furcula present; Abd IV longer than III; anal spines absent.

KEY TO THE GENERA OF NEARCTIC ENTOMOBRYINAE

1. Dentes with large fringed scales... **Cyphoderus** Nicolet, 1842
Dentes without large fringed scales.....2
2. Antenna 4-segmented.....3
Antenna 5-segmented.....**Heteromurus** Wankel, 1860
Antenna 6-segmented.....**Orchesella** Templeton, 1835
3. Distal antennal segment strongly annulate.....4
Distal antennal segment not annulate or indistinctly
annulate.....5
4. Eyepatch dark.....**Lepidocyrtinus** Börner, 1903
Eyepatch not dark.....**Troglosinella** DeBoutteville, 1949
5. Scales present.....6
Scales absent.....9

¹ A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico, Albuquerque, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

² Part VIII, Ent. News 73(6) : 141-145.

³ Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta 22, Georgia.

6. Mucro not toothed.....**Drepanocyrtus** Handschin, 1925
 Mucro 1-toothed.....7
 Mucro 2-toothed.....**Salina** MacGillivray, 1894
7. Dens with ventral scales.....8
 Dens without ventral scales.....**Sira** Lubbock, 1868
8. Eyes 8 and 8.....**Lepidocyrtus** Bourlet, 1839
 Eyes 5 and 5 or fewer.....**Pseudosinella** Schaffer, 1897
9. Mucro with basal spine.....10
 Mucro without basal spine.....**Calx** Christiansen, 1959
10. Dens without spines.....11
 Dens with spines.....**Homidia** Börner, 1906
11. Ant II not longer than IV.....12
 Ant II longer than IV.....**Isotobryoides** Maynard, 1951
12. Eyes 8 and 8.....13
 Eyes 4 and 4 or fewer or absent.....**Sinella** Brook, 1882
13. Inside of tibiotarsus with parallel rows of setae.....
 **Entomobryoides** Maynard, 1951
 Inside of tibiotarsus without parallel rows of setae.....14
14. Mucro toothed.....**Entomobrya** Rondani, 1861
 Mucro untoothed.....**Drepanura** Schott, 1891

Genus **DREPANURA** Schott, 1891

Body elongate, not subglobose; prothorax naked, greatly reduced; Adb IV more than $2\frac{1}{2}$ times length of III; dentes dorsally crenulate; scales absent; mucronal teeth absent; eyes 8 and 8, on dark eyepatches; distal antennal segment pseudoannulate or without annulations; antennal segments 4; dentes without scales ventrally.

KEY TO SPECIES OF NEARCTIC DREPANURA

1. Without dark markings on thorax.....**socorrensis** sp. nov.
 With dark markings on thorax.....2
2. Without dark markings on Abd II or III.....
 **californica** Schott, 1891
 With dark markings on Abd II or III.....3
3. Ant IV with indications of subsegmentation.....
 **annulicornuta** sp. nov.
 Ant IV without indications of subsegmentation.....4
4. Abd I and II with dark markings.....5
 Abd I and II without dark markings.....
 **perpulchra** Packard (1873)
5. Ant II to IV about as 3:4.....**neomexicana** sp. nov.
 Ant II to IV about as 8:9.....**rolfsi** Mills, 1935

***Drepanura californica* Schott, 1891**

NEW MEXICO RECORDS. .Berleses of (1) aspen-fir litter, 9,700 ft, Rio Arriba Co., 13-viii-1953; and (2) rotten pine log, 7,500 ft, Lincoln Co., 1-vii-1951.

DISTRIBUTION. Calif., N. M.

***Drepanura annulicornuta* sp. nov. Fig. 1**

TYPE LOCALITY. Holotype and 12 paratypes from NW of Jemez Springs, Jemez Mts., Sandoval Co., NEW MEXICO; from rock at edge of pond in spruce area, 8,100 ft, 24-viii-1953. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

DESCRIPTION. Body elongate, not subglobose; segmentation distinct; Abd V and VI confluent; integument smooth; yellow to orange with dark blue to black markings; middorsal surface black on Th II, III, and Abd I; black band on Abd II; dark shadings on Abd III-IV and Abd V-VI; long, truncated setae; scales absent; head prognathous; antenna to head approximately as 3:2; antennal segments approximately as 1:3:2:4; Ant IV with indications of subsegmentation; eyes 8 and 8; eyepatches dark; mouthparts chewing; body segments approximately as 4:2/1:2:1:10:3; pronotum obscured by mesonotum; tibiotarsus without distal subsegments; claw not tunicate; unguiculus to unguis approximately as 5:8; tenent hairs split as in *Tomocerus*, one on each tibiotarsus; unguis with 5 teeth; unguiculus with 1 tooth; furcula reaching collophore; manubrium to dens to mucro approximately as 3:24:1; furcula with setae ventrally; dental spines absent; dentes dorsally crenulate; mucro falcate, non-lamellate; anus terminal; anal spines absent; length 1.6 mm.

DISCUSSION. This species differs from all other members of the genus in the weak subsegmentation of Ant IV and in coloration. Ant IV shows an indication of subsegmentation which is quite evident in some specimens. This may be sufficient reason to place this species in the genus *Lepidocyrtinus*. However, the similarity in appearance to species of *Drepanura* in many other respects has caused me to place this species in the present genus.

Drepanura neomexicana sp. nov. Fig. 2

TYPE LOCALITY. Holotype and 10 paratypes from LaCueva, Jemez Mts., Sandoval Co., NEW MEXICO, from rotten pine log, 7,600 ft, 23-vii-1950. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

DESCRIPTION. Body elongate, not subglobose; segmentation distinct, segments without ankylosis; integument smooth; yellow with black stripes anteriorly and laterally on Th II and laterally on Th III, Abd I, II, and III; a posterior black stripe across Abd IV; some dark marks on Abd V and VI; clothed by long truncate setae; head prognathous; antenna to head approximately as 7:3; antennal segments approximately as 5:9:11:12; eyes 8 and 8; eyepatches dark; mouthparts chewing; ratio of body segments approximately as 7:5/3:5:4:16:3:3; prothorax partially obscured by mesothorax, particularly dorsally; tibio-tarsus without distal subsegment; claws tunicate; unguiculus to unguis approximately as 5:9; tenent hairs 1, 1, 1; unguis with 3 teeth; unguiculus without teeth; furcula not ankylosed, reaching to collophore; dental spines absent; dentes dorsally crenulate; mucro without teeth, non-lamellate; anus terminal; anal spines absent; length 1.3 mm.

DISCUSSION. This species differs from all other known members of the genus in its coloration and in that Ant IV shows no indication of subsegmentation.

NEW MEXICO RECORDS. Type collection plus 11 collections from logs (yellow pine, aspen, "coniferous"), 3 beneath dung, 1 beneath rocks, and 19 Berlese samples (juniper, pinyon, yucca, oak, Gambel oak, *Quercus turbinella*, live oak, oak-juniper, yellow pine-Gambel oak, walnut, yellow pine, *Juniperus pachyphloea*); 6,100 to 10,400 ft, Bernalillo, Catron, Colfax, Lincoln, Sandoval, Santa Fe, San Miguel, Socorro, Taos, and Torrance Co.; Jan. to Oct., 1950-54.

Drepanura socorrensis sp. nov. Fig. 3

TYPE LOCALITY. Holotype and 19 paratypes from N of Socorro, Socorro Co., NEW MEXICO; Berlese of mesquite litter,

4,800 ft, 24-vii-1954. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

DESCRIPTION. Body elongate, not subglobose; segmentation distinct, without ankylosis; integument smooth; yellow with irregular light blue stripe across Abd III; sometimes with other small light blue areas on body; antenna gray; clothed by long truncate setae; head prognathous; antenna to head approxi-

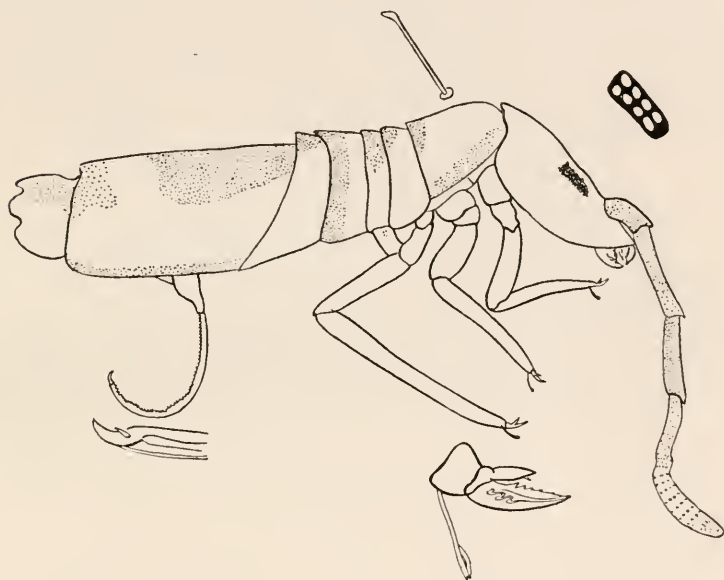


FIG. 1. *Drepanura annulicornuta* sp. nov.

mately as 2:1; antennal segments approximately as 4:6:5:8; eyes 8 and 8, on dark eyepatches; mouthparts chewing; tibiotarsus without distal subsegment; claws not tunicate; unguiculus to unguis approximately as 1:2; tenent hairs absent; unguis without teeth; unguiculus without teeth; furcula reaching collophore; manubrium to dens to mucro approximately as 10:13:1; dental spines absent; dentes dorsally crenulate; mucro falcate, non-lamellate; anus terminal; anal spines absent; length 1.6 mm.

DISCUSSION. This species differs from all other known members of the genus in the following combination of characters: (1) No dark markings on thorax; (2) antenna not annulate; (3) Abd III only segment with entire transverse band.

Genus *ENTOMOBRYOIDES* Maynard, 1951

DIAGNOSTIC CHARACTERISTICS. Body elongate, not subglobose; segments not ankylosed; scales absent; antenna 4-segmented; Ant IV not subsegmented; Ant II not longer than IV; eyes 8 and 8, on dark eyepatches; prothorax reduced; tibiotarsus with parallel rows of setae; Abd IV more than $2\frac{1}{2}$ times III; dens without spines; mucro with basal spine.

KEY TO SPECIES OF NEARCTIC *ENTOMOBRYOIDES*

1. Median tooth of unguis longer than basal tooth.....*guthriei* (Mills, 1931)
 Median tooth of unguis subequal to or shorter than
 basal tooth.....2
2. Thorax and Abd I-III with large dorsal spots.....*mineola* (Folsom, 1924)
 Thorax and Abd I-III unicolorous or striped.....3
3. Apex of mucro sharply upturned, parallel with tooth.....*dissimilis* (Moneiz, 1894)
 Apex of mucro slightly upturned, not parallel with tooth....
 *purpurascens* (Packard, 1873)

Entomobryoides guthriei (Mills, 1931)

NEW MEXICO RECORD. Taos Co., by Christiansen (1958).

DISTRIBUTION. Ariz., Calif., Colo., Idaho, La., Mont., N. M., Ore., S. D., Utah, Wash., Wyo.; Alberta and British Columbia (Canada).

Entomobryoides mineola (Folsom, 1924)

NEW MEXICO RECORDS. Berleses of (1) oak litter, 8,700 ft, Sandia Mts., Bernalillo Co., no date; (2) juniper litter, 7,600 ft, Glorieta Mesa, San Miguel Co., 6-viii-1953; and (3) oak litter, 7,500 ft, NE of Grants, Valencia Co., 6-viii-1952.

DISTRIBUTION. N. M., N. Y., N. C., Europe, South America.

Entomobryoides purpurascens (Packard, 1873)

NEW MEXICO RECORDS. Sixty-one collections—26 from logs or stumps (aspen, fir, limber pine, oak, spruce, yellow pine); 17 from ant nests; 9 from under rocks; 1 from under dung; and 2 Berleses from grass roots and litter (alder, aspen, fir, spruce);

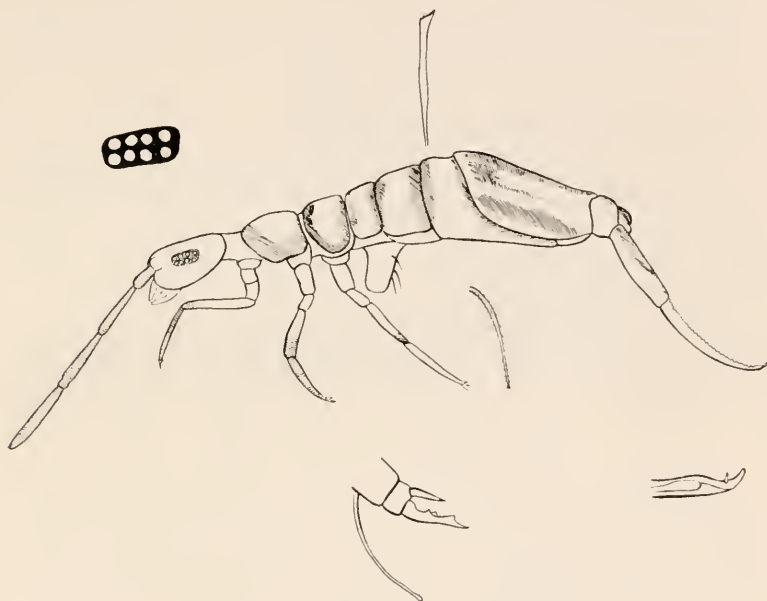


FIG. 2. *Drepanura neomexicana* sp. nov.

6,600 to 11,800 ft, Bernalillo, Colfax, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, Socorro, Taos, and Valencia Co.; June to Oct., 1950–1954.

DISTRIBUTION. Colo., Del., Ill., Iowa, La., Maine, Minn., Md., Mass., N. H., N. J., N. M., N. Y., N. D., Pa., Tenn., Texas, Utah, Wisc.; Ontario (Canada), Europe.

Genus **ISOTOBRYOIDES** Maynard, 1951

DIAGNOSTIC CHARACTERISTICS. Body elongate, not subglobose; four antennal segments, distal segments not annulate; eyes 8 and 8 not on dark eyepatches; prothorax naked, greatly reduced; Abd IV more than $2\frac{1}{2}$ times Abd III; dentes dorsally crenulate, with setae ventrally; mucronal teeth 2; basal mucronal spine present.

NOTE. The only known species of this genus is *Isotobryoides ochracius* Maynard, 1951.

Isotobryoides ochracius Maynard, 1951

NEW MEXICO RECORDS. Five Berlese samples (cottonwood, Gambel oak, fir, aspen, yellow pine) plus 1 from ant nest, and 1 sweeping grass; 4,100 to 11,600 ft, Bernalillo, Dona Ana, Mora, Rio Arriba, Sandoval, Socorro, and Torrance Co.; June to Nov., 1949–1954.

DISTRIBUTION. Ariz., Calif., Colo., Idaho, La., Mont., N. M., Ore., S. D., Utah, Wash., Wyo.; Alberta and British Columbia (Canada).

Genus **SINELLA** Brook, 1882

DIAGNOSTIC CHARACTERISTICS. Body elongate, not subglobose; Abd IV more than $2\frac{1}{2}$ times length of Abd III; dentes dorsally crenulate; scales absent; one mucronal tooth; eyes absent or two on each side; distal antennal segment never annulate; four antennal segments.

KEY TO SPECIES OF NEARCTIC **SINELLA**

1. Eyes 3 and 3.....**sexoculata** (Schott, 1896)
- Eyes 2 and 2.....2
- Eyes 1 and 1.....**binoculata** (Schott, 1896)
- Eyes absent.....3
2. Eyes placed transversely on head...**quadrioculata** Mills, 1935
- Eyes placed longitudinally on head....**curviseta** Brook, 1882
3. Mucro toothed.....**hoffmani** Wray, 1952
- Mucro falcate.....**hofti** Schaffer, 1896

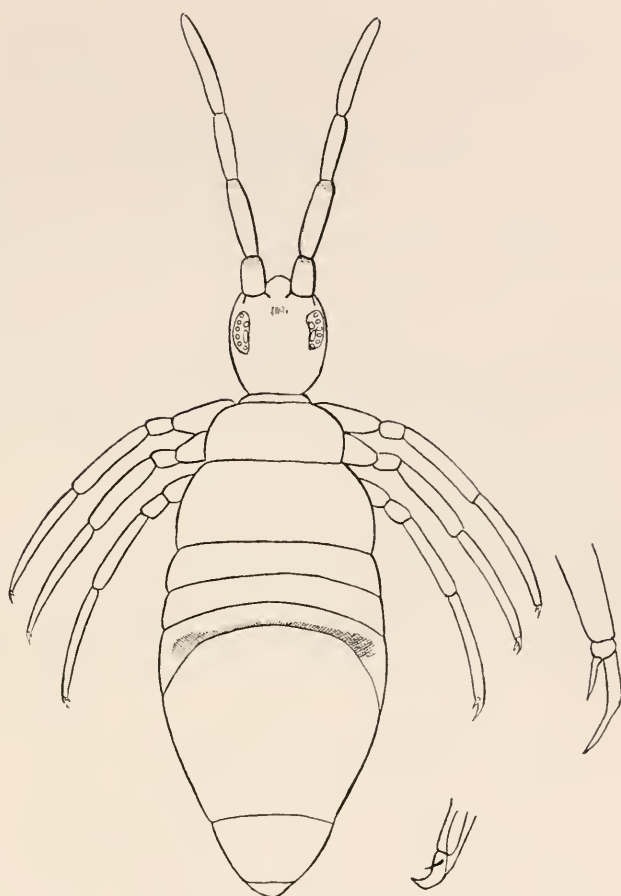


FIG. 3. *Drepanura socorrensis* sp. nov.

***Sinella binoculata* (Schott, 1896)**

NEW MEXICO RECORDS. Six Berlese samples (spruce, fir, aspen, oak, alder), plus 5 other collections (with ants, sweeping juniper, under bark of limber pine bole, light trap, under dung) ; 5,200 to 10,300 ft, Bernalillo, Colfax, Sandoval, Socorro, Taos, Torrance and Valencia Co.; May to Sept., 1950-1959.

DISTRIBUTION. Calif., N. M.

SUMMARY

Four species of *Drepanura* (including *D. annulacornuta* sp. nov., *D. neomexicana* sp. nov., and *D. socorrensis* sp. nov.), 3 species of *Entomobryoides*, *Isotobryoides ochracius*, and *Sinella binoculata* are recorded with ecological data from New Mexico. Of these, only *E. guthriei* is previously recorded from the state. Keys to genera of Nearctic Entomobryinae and to Nearctic species of *Drepanura*, *Entomobryoides* and *Sinella* are included.

REFERENCES CITED

- BORNER, C. 1903. Sitz. Ges. naturf. Freunde 3: 154.
——. 1906. Mitt. naturhist. Mus. Hamburg 23: 173.
BOURLET, A. 1839. Mem. Soc. Sci. Agr. Lille, vol. of 1839(1): 391.
BROOK, G. 1882. Jour. Linn. Soc. London, Zool. 16: 543.
CHRISTIANSEN, K. 1958. Syst. Zool. 7(1): 8-15.
——. 1959. Bull. Mus. Comp. Zool. 118: 532.
DEBOUTTEVILLE, D. 1949. Notes Biospeologiques 4: 118.
FOLSOM, J. 1924. American Mus. Nov. 108: 1-12.
HANDSCHIN, E. 1925. Treubia 6: 236.
LUBBOCK, J. 1868. Trans. Linn. Soc. London 26: 295.
MACGILLIVRAY, A. 1894. Canadian Ent. 26: 107.
MAYNARD, E. 1951. Collembola of New York. Ithaca: Comstock Pub. Co., xxiv + 339 pp.
MILLS, H. 1931. American Mus. Nov. 464: 1-11.
——. 1935. Bull. Brooklyn Ent. Soc. 30: 133-139.
MONIEZ, R. 1894. Rev. Biol. N. France 6: 201-215.
NICOLET, H. 1842. Nouv. Mem. Soc. Helvetia Sci. Nat. 6(3): 1-88.
PACKARD, A. 1873. Ann. Rept. Peabody Acad. Sci. 5: 39.
RONDANI, C. 1861. Dipterologicad Ital. Prodromus 4: 40.
SCHAFER, C. 1896. Mitt. naturhist. Mus. Hamburg 13: 151.
——. 1897. Magalh. Sammel. Hamburg p. 39.
SCHOTT, H. 1891. Bih. Svenska Vet.-Akad. Handl. 17: 1-25.
——. 1896. Proc. California Acad. Sci. ser. 2, 6: 169-196.
TEMPLETON, R. 1835. Trans. Ent. Soc. London 1: 92.
WANKEL, H. 1860. Lotos, p. unknown; same in 1861, Sitz. Acad. Wiss. Wien 43: 251.
WRAY, D. 1952. Bull. Brooklyn Ent. Soc. 47: 95-106.

The Rediscovery of *Listrognathus nubilipennis* (Cresson) (Hymenoptera, Ichneumonidae)

CHARLES C. PORTER, Biological Laboratories, Harvard University, Cambridge, Mass.

Listrognathus nubilipennis (Cresson) has been known for many years from the type alone, a female described by E. T. Cresson from "Georgia" in 1878. In his revision of 1929 Cushman tentatively placed a male from Vienna, Virginia, with this species, but his specimen, differing in several striking particulars from Cresson's type, became later one of the paratypes of Townes' *Listrognathus femorata* (Townes, 1962).

Recently, however, while on a collecting trip supported by a National Science Foundation Grant in Evolutionary Biology to the Biology Department of Harvard University, I was able to obtain additional specimens of *L. nubilipennis* on the Coastal Plain of North Carolina, including two males which share the distinguishing features of the type female almost exactly. I give below, therefor, a description of the hitherto unknown male and certain remarks upon the additional females.

Listrognathus (*Listrognathus*) *nubilipennis* (Cresson).

Mesostenus nubilipennis Cresson, 1878, Canadian Ent., vol. 10, pg. 205. Female.

Listrognathus albomaculatus var. *nubilipennis* (Cresson) Cushman. Proc. U. S. Nat. Museum 74(16), pg. 19.

Listrognathus (*Listrognathus*) *nubilipennis* (Cresson) Townes. Bulletin 216, U. S. Nat. Museum, pt. 3, pg. 416.

Male: Black. Face, frontal orbit to just behind top of eye; clypeus, cheek, lower two-thirds of temporal orbit; mandibles, except tips; palpi; a thin dorsal line on flagellar segments 8-17; scape in front; collar; humeri of pronotum; tegulae, line beneath; large, somewhat triangular, patch on lower half of mesopleuron, large round spot apically on central lobe of mesoscutum; most of scutellum, postscutellum; large area just behind and

below insertion of hind wing; a pair of broad, elongate dorso-apical maculae on the propodeum; a broad, slightly sub-apical, band on the second abdominal tergite, a similar apical band on the other tergites, and narrower apical bands on the sternites, white. Front and middle coxae and trochanters white, slightly stained with brownish above; front and middle femora and tibiae fulvous, the femora tipped with whitish and the tibiae with a weak white stripe dorsally; front and middle tarsi white, the apical segment dusky. Hind coxae ferruginous with a white spot above, strongly stained with black dorso-laterally; hind trochanters and femora ferruginous, about apical third of hind femur black-infusate; hind tibia black with a broad sub-basal white annulus; hind basitarsis black with a narrow basal and rather broad apical white annulus; hind tarsomeres 2-4 white, 5th segment stained with blackish on its apical half. Wings hyaline with a broad but pale and indefinite apical infuscation of both fore and hind wings.

The second specimen, from the same locality, is very similar but differs in the following small particulars: Orbits almost entirely white, with just a tiny break at upper two-thirds of hind margin of eye. White line on flagellum covering only 7 segments. Hind coxae more uniformly ferruginous, with but a slight blackish infuscation basally.

Female: These specimens differ from the female of the closely related *L. femorata* Townes in just those characters indicated by Townes (1962) for the type: hind coxa with a white spot above; hind femur ferruginous with a fuscous tip; front wing with more distinct median infuscation. In addition they differ by the complete or almost complete orbital white marks as described for the male; in having, for two of the three specimens, a squarish facial white macula; in the more complete white band on the collar, which is only narrowly interrupted above, if at all; and in the black rather than ferruginous ground color of the first tergite. In both sexes the punctures of the postpetiole are a little closer medially than laterally, or, at least, not distinctly sparser than laterally, as described for *L. femorata* by Townes.

From the males described above these females differ only in

the partially to wholly black face; the rather strong central infuscation of the fore-wings, and the usual sexual characters.

Specimens examined: 2 females and 2 males, Phelps Lake State Park, North Carolina, June 16, 1962. C. C. Porter and M. W. Dix. (Porter Collection.) 1 female. Edenton, North Carolina. June 18, 1955. C. C. Porter. (Porter Collection.)

At Phelps Lake State Park the species was found to be moderately abundant in the Cypress Swamp which immediately borders the lake. The Edenton specimen was found crawling on a Cypress tree. In such habitats the species seems rather common, if elusive, and should eventually be found to occupy a wide range on the Coastal Plain of the southeastern United States.

Biological Notes on *Campsomeris plumipes confluenta* (Say) (Hymenoptera: Scoliidæ)

FRANK E. KURCZEWSKI¹

The genus *Campsomeris* is represented in the United States by not more than ten species. That biological notes on the nearctic species are sparse aside from an occasional flower record, and that the nesting habits are unknown are not so surprising because females of *Campsomeris* never maintain a definite burrow and are extremely difficult to observe. The habits of the exotic *Campsomeris* are as follows: females locate their prey by olfaction, burrow into the sand in search of the prey, sting it, place an egg on it, construct a crude cell around the prey to which the egg adheres, emerge from the sand, and go off in search of another victim. It is believed that all members of this genus use larval Scarabaeidae as prey.

During the summers of 1959, 1960, and 1961, while studying various solitary wasps at Presque Isle State Park, Pennsylvania, I was able to obtain dates of emergence, flower records, data on male activity, and nesting notes on *Campsomeris plumipes confluenta*.

¹ Department of Entomology, Cornell University, Ithaca, New York.

fluenta (Say). All observations on this species were made in areas of bare sand or sand with a sparse cover of grasses adjacent to the main road that traverses the Park. *C. plumipes confluenta* was especially common within an area of 5.95 to 6.65 miles from the junction of Route 5A with the Park drive.

I am indebted to Dr. K. V. Krombein for the identification of the wasp and to Dr. D. M. Anderson for determining the larval Scarabaeidae which were possible wasp prey. Funds for the summer of 1961 were provided in part by a Sigma Xi RESA Grant-in-Aid of Research.

The earliest record of the emergence of this species over a three-year period at this locality was for males, on May 30, 1959. During the first few days of June, until the emergence of males of *Episyrus quinquenotatus quinquenotatus* (Say) (Pompilidae), these males of *Campsomeris* were the most numerous in the Park and they were observed making long, rapid, sinuous flights 10 to 30 centimeters above the surface in sandy areas containing sparse to somewhat dense stands of bunch and rye grasses and sage brush. Rarely, at intervals, males rested for five or ten seconds on upright grass stems. After a short rest, they continued their flights that were usually of many meters. Males were most numerous throughout June, and by the third week of July nearly all had disappeared from the scene. Apparently, males obtain most of their nourishment from flowers; they were collected in June on *Rubus hispidus* (swamp dewberry) and *Arabis lyrata* (rock cress), and in July on *Melilotus alba*.

Females of this species of *Campsomeris* emerged in late June and were present in the Park until nearly mid-September; early and late dates for females are June 28 and September 9, respectively. This period of time corresponds with the life expectancy of females of this genus which is believed to be from two to three months. As compared with the flights of males, those of recently emerged females are slower, deliberate, and the direction appears to be straight rather than sinuous. They were noted visiting flowers of *Rubus hispidus* (June), *Solidago juncea* (July), and *Cephalanthus occidentalis* (buttonbush) (July).

Krombein² found both sexes of *C. plumipes fossulana* (Fabricius) in North Carolina on flowers of *Cephalanthus occidentalis*.

On July 1, 1961, at 1500 hours, a female was observed making extremely slow flights a few centimeters above the sand surface. After two flights each of about 50 centimeters, this wasp came to rest atop a small mound of sand on which there was a stand of bunch grass. It then walked slowly forward over the sand, tapping the distal segments of its antennae on the sand surface and flicking its wings at intervals. After walking not more than four centimeters, the wasp stopped and began burrowing into the mound just below the base of the stand of grass, using only its mandibles, and turning its head from side to side in an arc. This was done at a very slow pace, not with the rapidity that most digger wasps display when beginning an excavation with their mandibles and fore legs. The legs were not used in moving sand, but only to aid the wasp twist and bore its way forward into the sand. Most of the time the legs were held rigidly backward, especially the hind legs which were held backward and braced against the sand, and seemed to be used only as struts for support. During the entire process, the wings were folded flatly over the dorsum of the abdomen, which lay limply on the sand surface. After the wasp had burrowed into the sand so that only half of its body was visible, it began turning and twisting its entire body repeatedly to the left and right in a semi-circle, and continued thus to work deeper into the sand. When only the apical half of the abdomen remained visible, the wasp twisted onto its back and the ventral surface of the abdomen curved upward as though in a stinging position. Twenty-five seconds after the wasp had started burrowing it disappeared completely and all that was evident was a small pile of damp sand where the wasp had entered the mound; no burrow or opening of any sort was visible. After nine minutes either this female or another emerged from the sand of the opposite side of the mound, made a flight of about two meters to another mound containing a stand of bunch grass, and repeated this behavior.

² KROMBEIN, K. V. 1952. Biological and taxonomic observations on the wasps in a coastal area of North Carolina (Hymenoptera: Aculeata). Wasmann Jour. Biol. 10: 257-341.

Excavation of the sand from these two mounds in areas where the wasp had burrowed revealed two large larvae of *Cotalpa lanigera* (Linnaeus) (Scarabaeidae) just beneath the bunch grass roots at depths of 9 and 12 cm, respectively. Both of these larvae were ventral side up, the entire body curved, suggesting a letter C on its back; both were in a quiescent state. No eggs were found, nor could it be ascertained whether this scarab was the actual prey being used by this *Campsomeris*. However, the burrowing of the wasp coupled with the finding of these larval scarabs almost directly beneath the site of this activity seems more than coincidental. If the eggs are extremely small in comparison with the size of the prey, as they are in exotic *Campsomeris*, it is possible that in making the excavation I dislodged them.

Personal

The State University College of Forestry at Syracuse, New York, has announced the appointment of Dr. JOHN B. SIMEONE as chairman of the Department of Forest Entomology. Dr. Simeone is a native of Providence, R. I. and was educated at R. I. State College, and at Yale and Cornell Universities.

Two New Species of Coleoptera (Scarabaeidae: Coprini)¹

CARL FARR MOXEY, Wayne, Pennsylvania

This paper is presented to make known two undescribed species that were discovered during the author's identification of Indian and Burmese Scarabaeidae. The descriptions are as follows:

¹ This study was made possible by a 1962 summer grant from the Jessup Fund Committee of the Academy of Natural Sciences of Philadelphia.

Copris neglectus Moxey, species nova.

Black, tinged with mahogany, shining, with the antennae, mouth-parts, and hairs red.

Oval and moderately convex. Head nearly semicircular, ocular lobes moderately punctured, vertex between the eyes sparsely punctured; clypeus feebly rugose, deeply notched in middle, with a lobe on each side of the notch. Pronotum strongly shining, feebly punctate, with a moderately strong median groove in basal half; antero-lateral angles rounded; side margins strongly rounded. Elytra fairly deeply striate; striae finely and remotely punctured (that is, the punctures separated by about twice their diameters); intervals nearly flat and scarcely perceptibly punctured. Pygidium finely and feebly punctured. Median lobe of metasternum very remotely punctured, with a deep pit near anterior angle; anterior angle very obtuse, rounded; sides of metasternum coarsely sculptured with setiform punctures. Fore tibia very broad, armed externally with four teeth; front femur moderately punctured, the mid and hind femora not so strongly punctured. Fore tibial spur slightly bent at the end.

♂. The head bears a slender, compressed horn. The anterior declivity of the pronotum is fairly steep, but has only a few remote punctures in the middle. The upper edge of the declivity bears a transverse, slightly elevated carina which forms a very much flattened V.

Length: 20.7 mm; breadth: 10.0 mm.

Type: ♂; Tiruchirappalli (Trichinopoly), Madras State, INDIA; October 1919; C. Leigh, collector (Frank R. Mason Collection; collection of the Academy of Natural Sciences of Philadelphia, type No. 8340).

The unique male type differs from *Copris sinicus* Hope in being more elongate, and in having the clypeus not so deeply emarginate, the antero-lateral angles of the pronotum more rounded, the median groove of the pronotum less evident, the sides of the metasternum with more hairs, and the fore tibiae slightly stouter.

***Onthophagus zymoticus* Moxey, species nova.**

Black, with the lower surface, legs, antennae, and mouth-parts slightly mahogany. The lower surface is clothed with reddish hairs, and the upper surface much less sparsely.

Oval, deeply waisted, moderately convex. Head flat, very coarsely punctured; clypeal margin pointed anteriorly, with two upturned teeth; clypeus bearing a rounded, transverse carina in its posterior edge, head with a similar, slightly larger, carina between the eyes. Pronotum very strongly convex, rather evenly punctured in median area, granulate on the sides; the area immediately surrounding the postero-lateral angles is rugosely granulate; pronotum bearing a very faint median canaliculation; antero-lateral angles rounded, obtuse; base obtusely angulate in middle. Elytra finely striate, the striae very finely and remotely punctured; intervals sparsely sculptured with setiform punctures, slightly convex. Pygidium rugosely punctured, the punctures very coarse, setiform. Median lobe of metasternum feebly punctured, sides more coarsely so, and with longer hairs. Fore tibiae quadri-denticulate, tibial spur curved. Mid and hind tibiae with distal margin straight.

Length: 8.0 mm; breadth: 4.9 mm.

Type: ♀; Shingbwiang. Upper BURMA, 665 feet; 6 June 1945; John W. H. Rehn, collector (Collection of the Academy of Natural Sciences of Philadelphia, type No. 8343).

This species is closely related to *Onthophagus rugulosus* Harold, from which it differs in being smaller and in not having the elytra as deeply striate, but having granules on the lateral areas of the pronotum.

Review

THE MOSQUITOES OF THE SOUTH PACIFIC (Diptera, Culicidae). John N. Belkin. 1962. University of California Press. Los Angeles. 2 vos. boxed. Vol. I, xii + 608 pp. (text); Vol. II, 412 pp. (charts, maps, plates). \$20.00.

This large comprehensive work provides an excellent treatment from all aspects of the mosquitoes of the South Pacific

from east of the Bismarck Archipelago to Easter Island and Sala y Gomez, and from the equator south to New Zealand and Macquarie Island.

The first volume contains an informative discussion of the mosquito fauna of the entire region and of each main subdivision of the area. The history of the fauna, centers of origin, general systematics, disease relations and economic importance, and the role of man in distributing the species are discussed. The systematic section includes keys to the subfamilies, tribes, genera and species for adults, immatures, and eggs (when known). Under each systematic unit descriptions of the adults and immatures are given along with the data on the systematics, bionomics, disease relations, economic importance, distribution and synonymy.

The second volume contains a series of charts giving the general distribution in the islands of the species, the extra-limited distribution, the distribution of the closest relatives, the bionomics, and stages known. These charts also indicate whether the species is endemic, indigenous, introduced, or spread by natives. There is an analysis of the distribution of the species groups and maps of the region and of the islands considered and there are distribution maps of the subfamilies, tribes, genera, and species. The major section of the volume is taken up with excellent figures by Charles L. Hogue of the characters of the adults and immatures.

The general format of the text and plates in separate volumes, while easier to print and esthetically pleasing, does make this work difficult to use in that one has to jump back and forth between two large volumes to check the distribution or figures of any systematic unit. Dividing the text and placing the plates in the same volume with the associated text would have made a more easily usable work.

SELWYN S. ROBACK

NOTICE. The December, 1962, issue of ENTOMOLOGICAL NEWS was mailed at the Post Office at Lancaster, Pa., on December 7, 1962.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus *Ceroglossus* wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Pacific Insects

A quarterly journal on the systematic entomology and zoogeography of the Pacific, East Asia, Australia and Antarctica.

Vols. 1-3 (over 500 pages per volume) each \$5.00
Vol. 4 (1962) (over 700 pages) \$7.00

Pacific Insects Monographs

Adjunct series appearing irregularly and not included in subscription. To be ordered separately or standing order placed.

- 1A. **The Chrysomelidae (Coleop.) of China and Korea. Part I.** By Gressitt and Kimoto. 299 pp., 75 figs. \$4.00
2. **Problems in the Zoogeography of Pacific and Antarctic Insects.** By Gressitt, with appendices by Maa, Mackerras, Nakata, and Quate. 128 pp., 40 figs. (incl. 2 color pls.). Bound, \$2.50. Paper, \$2.00

Order from: Bishop Museum, Honolulu 17, Hawaii.

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and Aedes aegypti and Culex quinquefasciata

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

**MEMOIRS OF THE AMERICAN
ENTOMOLOGICAL SOCIETY**

Number 17

**A TAXONOMIC STUDY OF THE
MILLIPED FAMILY SPIROBOLIDAE
(DIPLOPODA: SPIROBOLIDA)**

By William T. Keeton

**147 pages of text, 37 tables, 2 maps, 18 plates,
table of contents and index**

Spirobold millipeds are probably the most widely known Diplopoda in the United States, being used in many college courses; yet the family has been little studied. This monograph brings together existing knowledge of the group for the first time, and adds much new information gained from critical study of series. The taxonomic history of the family is outlined. External morphology is briefly treated, with emphasis on characters utilized in classification. A summary of current knowledge of life histories is included. The family is redefined, and each genus and species is treated in detail. Particular attention is given to variation and distribution, both of which become more meaningful biologically as a result of synonymizing many species names. Possible phylogenetic relationships of the genera are discussed, and keys to all taxa are provided, with most diagnostic characters illustrated in 18 plates or summarized in 37 tables.

Price \$5.50

**THE AMERICAN ENTOMOLOGICAL
SOCIETY**

1900 Race Street, Philadelphia 3, Penna., U.S.A.

ENTOMOLOGICAL NEWS

FEBRUARY 1963

Vol. LXXIV

No. 2

CONTENTS

McDermott—Frank Morton Jones (1869–1962)	29
Cook—Omartacaridae, a new family of water mites	37
Clench—Further notes on West African Lycaenidae	43
Pillai and Winston—Acaridae of Colorado	49
Nomenclature Notice	55

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.

AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.



ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.



FRANK MORTON JONES

ENTOMOLOGICAL NEWS

VOL. LXXIV

FEBRUARY, 1963

No. 2

Frank Morton Jones (1869–1962)

Dr. Frank Morton Jones died at his home in Wilmington, Delaware, on the afternoon of Tuesday, May 22, 1962. Although unable to be active during the last few years, he retained his keen interest in entomology until the end. Biological science is the poorer for his passing.

Born in Wilmington, Delaware, on January 13, 1869, the son of Joseph Jones and Deborah Hodgson Jones, Dr. Jones devoted a long and happy lifetime to various phases of entomology, specializing in Lepidoptera, largely the Microlepidoptera and particularly the Psychidae. Insectivorous plants, adaptive coloration, selection of insect food by birds, and many other phases of the subject were studied by him, always with profit to the sum of knowledge. One of his last studies was the determination of the insects being brought as food for the young by parent house wrens, as shown in strobe pictures taken by Mr. Crawford H. Greenewalt (see bibliography).

But his knowledge was far from being limited to entomology—he was a naturalist in the broad sense of being widely familiar with not only the local plants and animals, their habits, habitats, ecology, and lives, but with the world-wide spectrum of life which his Psychid studies in particular brought to him. His summer home on Martha's Vineyard Island was a continued delight to him as long as he was able to get there. Dr. Jones' work on the pitcher-plants, embraced in sixteen papers of which he was either the author, the co-author, or was associated with the research, is of particular scientific interest, and evidences the

thoroughness with which he pursued his studies. Beginning in the 1880's, Dr. Jones made collecting trips which took him into almost every state in the Union; particularly noteworthy was a two-months' journey in 1918 to California and Alaska. On a trip to Bermuda, Dr. Jones collected the first member of the orthopteran genus *Paroxya*, the type specimen now being in the collection of the Academy of Natural Sciences of Philadelphia. After a visit to London on the occasion of his presentation of a paper before the Royal Entomological Society, Dr. and Mrs. Jones took a tour through western Europe and Switzerland.

Memberships in scientific societies included the American Association for the Advancement of Science (Member 1911; Fellow 1930), the Academy of Natural Sciences of Philadelphia, where he was a Research Associate in entomology; the New York Entomological Society; the Entomological Society of America (Charter Member 1906; Fellow 1946); the American Entomological Society; the Ecological Society; and in 1932 he was made a Fellow of the Royal Entomological Society of London. He was also a member of the Botanical Society of Pennsylvania.

In his own State, Dr. Jones was one of the founders of the Society of Natural History of Delaware in 1891, and one of the incorporators in 1919, and the guiding spirit of that Society for over 60 years. He was the last surviving Charter Member. He served as President from 1928 to 1941, and the directors of the Society unanimously elected him President-Emeritus in 1941. As President he arranged for several special features at the meetings, and four, in 1902, 1919, 1936, and 1953, were devoted to the periodical cicada under his interesting direction.

Aside from his scientific attainments, he was a member of the Board of Managers of the Wilmington Institute Free Library from 1921 to 1951, and on his resignation was elected an honorary member of the Board. He was also a member of the Board of Directors of the Wilmington Savings Fund Society from 1933 to 1942. Business connections occupied his attention from 1886 to 1914, first in the John G. Baker Co. and its successors, and after 1900 in the Hilles and Jones Co., of which he

was Treasurer until his retirement in 1914 to devote his time to scientific interests.

In 1931 the University of Delaware conferred on him the honorary degree of Doctor of Science, in recognition of his work in entomology and other fields.

Always gracious with his time to help and advise others, he has been an inspiration to many, and his wide contacts brought him recognition as an authority from many lands. His fund of anecdotes and humorous experiences was apparently inexhaustible, the product of a long and generally quiet but active life. His life-long association with the late Robert R. Tatnall was characteristic of his friendships. In 1946 there was a reception at Dr. Jones' home in honor of Dr. Tatnall on the publication of his "Flora of Delaware and the Eastern Shore," in which there are nine photographs taken by Dr. Jones.

Dr. Jones was a very competent photographer, both for direct views and in photography through a microscope. He was also an excellent draftsman, and many of his scientific papers are illustrated with his own drawings and photographs.

In 1900, Dr. Jones married Linda B. Palmer, who, as Mrs. Jones, served the Society of Natural History of Delaware as Secretary from 1903 to 1928 and as Assistant Secretary for two prior years. For more than half a century Mrs. Jones was a constant source of understanding assistance and inspiration to Dr. Jones, and a genial hostess to their many prominent scientific visitors. Mrs. Jones died in November, 1961.

Feeling that his extensive library and collections should be placed where they would be of use to future students, he gave the bulk of them to the Peabody Museum of Yale University in 1954. The Museum has designated his books as the Jones Entomological Library, and a special bookplate showing a pitcher-plant and a bagworm was designed for them. In addition to this, sets of periodicals and a large collection of Lepidoptera were given to the University of Delaware. A collection of Nantucket Heterocera and numerous specimens of Orthoptera collected during his travels were given to the Academy of Natural Sciences of Philadelphia. A large collection of Microlepi-

doptera was presented to the Smithsonian Institution (see ENTOMOLOGICAL NEWS, 1956, Vol. 67, p. 217). This gift was subsequently enlarged by a contribution in aid of research at the Smithsonian Institution on the Psychidae, including the use of his fine Spencer binocular microscope.

The following list of the publications of Frank Morton Jones gives an idea of the scope and diversity of his work and interests.

PUBLICATIONS

On Psychidae

- A new North American moth of the Family Psychidae. [*tracyi*]. Entom. News 22: 193-194, Pl. VI. 1911.
- A new North American psychid. [*toumeyii*]. Entom. News 33: 12. 1922.
- Two new psychids and notes on other species. [*celibata*, *caconemos*, *toumeyii*]. Entom. News 33: 129-135, Pls. VII, VIII. 1922.
- Variation in *Thyridopteryx*: Two new psychids. [*vernalis*, *watsoni*]. Entom. News 34: 97-103, Pls. III, IV. 1923.
- North American psychids: *edwardsi* Heyl. (*carbonaris* Pack.). Entom. News 36: 33-39, Pls. II, III. 1925.
- Hyaloscotes fumosa* Butler (Lepidoptera: Psychidae). Entom. News 36: 161-164, Pl. VI. 1925.
- Our largest psychid, *Oiketicus dendrokomos* n. sp. Trans. Amer. Entom. Soc. 52: 1-6, Pl. 1. 1926.
- A new psychid from South America. [*burrowsi*]. Trans. Entom. Soc. London 1926: 509-511, Pl. L. 1926.
- The mating of the Psychidae. Trans. Amer. Entom. Soc. 53: 293-312. 6 pls., 2 figs. 1927.
- The bagworms of Texas. Texas Agric. Expt. Sta. Bull. 382, pp. 1-36, Figs. 1-21. 1928.
- The identity of an introduced psychid, *Fumea casta* Pallas. Psyche 41: 19-34, Pls. II, III. 1934.
- Platoeceticus*, and a remarkable new species of the genus. Trans. Amer. Entom. Soc. 71: 99-124, 4 pls., 5 figs. 1945.
- Shade-tree insects. Civics Committee, New Century Club, Wilmington, Delaware, 1912 (includes *T. ephemeraciformis*, with two original illustrations, in a popular account of its habits and control).

On Adaptive Coloration

Insect coloration and the relative acceptability of insects to birds. Trans. Entom. Soc. London 80: 345-385, Pls. XVIII-XXVIII. 1932.*

* Published under a grant from the James Mark Baldwin Fund of Oxford University.

Discussion arising from the preceding paper, but not participated in by Dr. Jones except by quotation. The protective adaptations of animals, especially insects. At the meeting of the Entomological Society of London, December 7, 1932. Proc. Entom. Soc. London 7: 79-105, two illus. 1932.

Replies to W. L. McAtee's rejoinder. Proc. Entom. Soc. London 9: 21-40, 119-120. 1934.

Further experiments on coloration and relative acceptability of insects to birds. Trans. Entom. Soc. London 82: 443-453, Pls. XVI, XVII. 1934.

Relative acceptability and poisonous food plants. Proc. Royal Entomological Society, London, Ser. A, Vol. 12, pp. 74-76, 1937.

The sleeping Heliconias of Florida. Natural History 30: 635-644, illus. 1930.

Cirrophanus triangulifer Grt. in Delaware. Entom. News 48: 120-124. 2 Pls. 1937.

(Also many references to the significance of color in the article on pitcher-plants and their moths; for which see the following section.

On Carnivorous Plants

Pitcher-plant insects. Entom. News 15: 14-18, Pls. III, IV. 1904.

Pitcher-plant insects. II. Entom. News 18: 413-420, Pls. XV, XVI. 1907.

Pitcher-plants insects. III. Entom. News 19: 150-156. Pls. VIII, IX. 1908.

Two insect associates of the California pitcher-plant, *Darlingtonia californica*. Entom. News 27: 385-392, Pls. XX, XXI. 1916.

Dohrniphora venusta Coq. in *Sarracenia flava*. Entom. News 29: 299-302, Pl. XVII. 1918.

Another pitcher-plant insect (Diptera: Sciariinae). Entom. News 31: 91-94, Pl. I. 1920.

Biochemical studies of the pitcher-plant liquor of *Nepenthes*. By J. S. Hephurn. Proc. Amer. Phil. Soc. 57: 127-129. 1918. (Includes field work by Dr. Jones and others.)

- Biochemical studies of insectivorous plants. By J. S. Hepburn, E. Q. St. John, and F. M. Jones. Contrib. Botanical Laboratory Univ. Penna. 4: 419-463. 1919. (Dr. Jones' article on pp. 460-463.)
- Absorption of nutrients in the pitchers of the Sarraceniaceae. By J. S. Hepburn, E. Q. St. John, and F. M. Jones. Jour. Franklin Inst. 189: 133-184, 7 illus. 1920. (Awarded joint Certificate of Merit by the Franklin Institute.)
- Pitcher-plants and their moths. Natural History 21: 296-316, 22 illus. 1921.
- Studies of the North American Sarraceniaceae. By J. S. Hepburn, E. Q. St. John, F. M. Jones, and W. F. Baker. Proc. Amer. Soc. Biol. Chemists, in Jour. Biol. Chem. 50: xlvii. 1922. (Dr. Jones collected the plants for this paper.)
- Biochemical observations on certain insectivorous plants. By J. S. Hepburn. Jour. Franklin Inst. 191: 771-781. 1922. (Acknowledgment of assistance by Dr. Jones, pp. 777-778.)
- The most wonderful plant in the world. Natural History 23: 589-596, 7 illus. 1923.
- Biochemistry of the American pitcher-plants. By J. S. Hepburn, E. Q. St. John, and F. M. Jones. Trans. Wagner Free Inst. Sciences 11: 1-95, 10 illus. 1927.
- Illustrations of North American pitcher-plants. M. V. Walcott. Smithsonian Institution, 1935. Pitcher-plants and their insect associates, by F. M. Jones, pp. 25-34.*
- Darlingtonia Episodes. Delaware Notes, Univ. Delaware Ser. 23: 24-35. 1950. (Earlier pages contain references to other species of the Sarraceniaceae).

On Lepidoptera

- Variation in *Vanessa antiopa*. The Entomologist (London) 22: 279, 1889.
- Notes on *Smerinthus astylus*. Entom. News 1: 21-22. 1890.
- Two weeks in Richmond County, North Carolina. Entom. News 4: 189-191. 1893.
- A Christmas-Day moth hunt. Entom. News 8: 59-60. 1897.
- Notes on *Pamphila aaroni*. Entom. News 8: 60. 1897.
- Some Delaware Noctuidae. Entom. News 8: 77-78, Pl. V. 1897.
- (Pamphilinae; editorial explanation.) Entom. News 8, Pl. VII. 1897.

* Contains a description of *Sarracenia jonesi* Wherry.

- Is *Ceratonia catalpae* spreading northward? Entom. News 10: 43. 1899.
- Callosamia angulifera* Wlk., n. var. *carolina*. Entom. News 19: 231. 1908.
- Thecla damon* Cram. and its varieties. Entom. News 20: 397. 1909.
- Additional notes on *Callosamia carolina*. Entom. News 20: 49-51, Pls. III, IV. 1909.
- The Macrolepidoptera of the Bermudas. Entom. News 21: 165-168. 1910.
- The female of *Sesia rubrofascia* Hy. Edw. Entom. News 23: 122. 1912.
- A new *Papaipema* from Delaware. By Henry Bird and F. M. Jones. Canad. Entom. 53: 137-139, Pl. VI. 1921.
- The rediscovery of "*Hesperia bulenta*" Bdl.-Lec., with notes on other species. Entom. News 37: 193-198, Pl. IX. 1926.
- The Lepidoptera of Nantucket and Martha's Vineyard Islands, Massachusetts. By F. M. Jones and C. P. Kimball. (Introduction and section on Martha's Vineyard by F. M. Jones.) Nantucket Maria Mitchell Associates 4: 1-217. 1943.

On Other Orders

- Dermestes vulpinus* in goat skins. Insect Life 2: 63-64, 2 figs. 1889.
- (Note on *Latrodectus mactans*). Insect Life 7: 276. 1894.
- (Note on army worm moths in Wilmington, Delaware). Insect Life 7: 279. 1894.
- Dynastes tityus* in Pennsylvania and Delaware. Entom. News 41: 305-306. 1930.
- Another Oriental mantis well established in the United States. Entom. News 44: 1-3, Pl. I. 1933.
- Notes on *Melanophora roralis* (Diptera). Psyche 55: 31-34. 1948.

Juvenile

- Lightning-bugs. Scattered Seeds 51: 129-130. 1919.
- Baskets of Eggs. Scattered Seeds 53: 28-30, 2 figs. 1921.
- Baskets of Eggs. II. Scattered Seeds 53: 51-53, 2 figs. 1921.
- A butterfly from over the sea. Scattered Seeds 53: 126-127, 2 figs. 1921.
- The worst butterfly. Delaware School Jour. 2: 24. 1917.
- Lady-bird beetles. Delaware School Jour. 2: 14. 1917.
- Lightning-bugs. Delaware School Jour. 2: 21. 1917.

Miscellaneous

- Library Service for "Greater Wilmington." Wilmington Inst. Free Library. 1926.
- The Fifth International Congress of Entomology. *Entom. News* 43: 250-251. 1932.
- George D. Eustis of Hollyholm, a Martha's Vineyard naturalist. *Bull. New England Mus. Nat. Hist.* 87: 14-15. 1938.
- Natural Selection. *The Coterian*, Wilmington, Del. 1 (2): 3-6. 1891. (Signed "J.")
- The Journal of Andreas Hesselius, 1711-1724. *Delaware History* 2: 63-118. 1947. (Includes 39 signed footnotes by F. M. Jones relating to included natural history. Hesselius gives an early and remarkably careful account of the periodical cicada, pp. 97-99.)
- Description of the cypress swamps in Delaware and Maryland, 1797. *Delaware History* 3: 123-137. 1949. (Introduction and annotations by F. M. Jones.)
- Reminiscences of a Delaware naturalist. *Delaware Notes Ser.* 23: 13-35. 1950. (This item is duplicated in part as "Darlingtonia Episodes" in this bibliography.)
- In "Naturalist's Guide to the Americas." V. E. Shelford, Editor. *Ecolog. Soc. Amer.* 1926. Section on Delaware, pp. 398-401, by F. M. Jones.
- Photographic studies of the feeding of nestlings by house wrens. By Crawford H. Greenewalt and F. M. Jones. *Trans. Amer. Phil. Soc.* 99 (4): 200-204. Also in *Amer. Scientist* 43: 541-549. 1955.

Not listed are numerous references to the work of Dr. Jones in, e.g., Hugh B. Cott's "Adaptive Coloration," E. F. Lloyd's "Carnivorous Plants," and Aldrich's "Sarcophaga," the latter containing a list of Dr. Jones' rearings and assistance. Also numerous unpublished papers read before various organizations.

At least one species of plant and several new species of insects have been named for Dr. Jones, and one for Mrs. Jones.

The information for this biography and bibliography was prepared mainly by Dr. Jones' sister-in-law, Mrs. Florence Palmer Sterrett, to whom my most sincere thanks are due.

FRANK A. McDERMOTT

Omartacaridae, a New Family of Water Mites from the Ground Waters of North America^{1, 2}

DAVID R. COOK, Wayne State University, Detroit, Michigan

OMARTACARIDAE new family

Diagnosis: (Based on female, male unknown) Body elongated, integument soft; integument colorless, but some red pigment present in deeper tissues; muscle attachment plates absent; coxal area confined to anterior portion of body; coxal groups separated but lying very close together (Fig. 1); first, second, and fourth coxae reaching the midline, third coxae separated; fourth coxae reduced in size; genital field located well posterior to the coxal area; two elongated acetabular plates present; genital acetabula numerous; gonopore slit-like, much longer than acetabular plates in female; capitulum with a well developed rostrum; chelicera with two segments, chelicera fused medially; ventral side of P-IV with a tubercle bearing a peg-like seta; distodorsal portion of P-IV not extending far beyond insertion of P-V, not forming a chelate palp (Fig. 7); legs, especially the fourth pair, relatively long; a few swimming hairs present.

Nymph resembling adult except for lack of a gonopore.

Discussion: The new family does not seem to be closely related to any previously described water mite family, but there seems no doubt but that it should be assigned to the superfamily Hydryphantoidea Piersig. The structure of the palp, with its tubercle on P-IV and lack of a chelate P-IV and P-V, suggests that Omartacaridae is among the most highly evolved of the superfamily. A more refined placement of the new family must await the finding of the male and probably the larval stage. Two distinct types of nymphs have been taken, which differ among other things in structure of the palp and the first legs. There are two possible explanations for the two nymphal types.

¹ Contribution No. 88 from the Department of Biology, Wayne State University.

² This study supported by a grant (G-9042) from the National Science Foundation.

Either more than one species is present or there is a rather pronounced sexual dimorphism which also is exhibited by the nymphs.

Genus **OMARTACARUS** new genus

Genotype: *Omartacarus elongatus* n. sp.

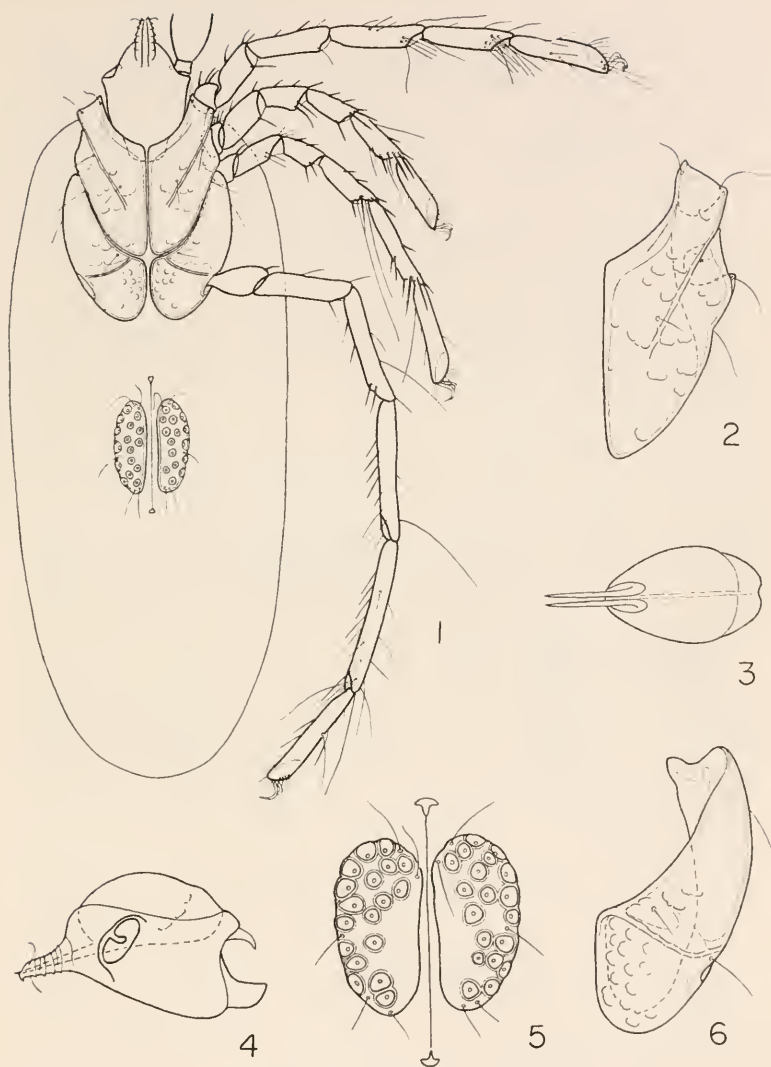
Diagnosis: With the characters of the family Omartacaridae.

Omartacarus elongatus new species (Figs. 1-14)

Female: Body soft and very distensible, length approximately $835\text{ }\mu$ - $1090\text{ }\mu$; coxal area confined to anterior portion of body; coxal groups separated but lying very close together; capitular bay relatively wide; suture line between first and second coxae not extending to midline (Fig. 2); glandularia E-1 not observed, either they have shifted to sides of coxal margins at an angle which makes it impossible to observe them, or they are absent; third coxae somewhat triangular in shape, median margins not extending to midline (Fig. 1); fourth coxae small and somewhat semicircular in shape; median margins of fourth coxae broad (Fig. 6); few setae present on coxae; genital field lying considerably posterior to the coxal area; genital field consisting of two elongated acetabular plates separated by a slit-like gonopore (Fig. 5); pre- and postgenital sclerites very small, located well anterior and posterior to the acetabular plates; the individual acetabular plates $104\text{ }\mu$ - $133\text{ }\mu$ in length, $45\text{ }\mu$ - $52\text{ }\mu$ in width; genital acetabula 15-19 on each side; acetabular plates with a few long setae.

Capitulum $167\text{ }\mu$ - $198\text{ }\mu$ in length; anterior end of capitulum drawn out into a rostrum (Fig. 4); this rostrum with characteristic integumental wrinkles; capitular apodemes short; capitulum relatively wide, approximately one-half width of coxal area; chelicera two-segmented, distal segment shorter than proximal segment; chelicera fused medially (Fig. 3); chelicera $152\text{ }\mu$ - $167\text{ }\mu$ in length.

Dorsal lengths of the palpal segments: P-I, $23\text{ }\mu$ - $29\text{ }\mu$; P-II, $102\text{ }\mu$ - $117\text{ }\mu$; P-III $40\text{ }\mu$ - $48\text{ }\mu$; P-IV, $73\text{ }\mu$ - $86\text{ }\mu$; P-V, $55\text{ }\mu$ - $59\text{ }\mu$; P-III expanded ventrally at distal end; P-IV narrow, bearing a large tubercle near distal end, this tubercle with a



Omartacarus elongatus n. sp. Female

FIG. 1, ventral view; FIG. 2, anterior coxal group; FIG. 3, chelicera, ventral view; FIG. 4, capitulum, lateral view; FIG. 5, genital field; FIG. 6, posterior coxal group.

short, heavy, peg-like seta; Figure 7 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, $122\ \mu$ – $145\ \mu$; I-leg-5, $118\ \mu$ – $130\ \mu$; I-Leg-6, $114\ \mu$ – $129\ \mu$; Figure 13 shows I-Leg-5 and 6; dorsal lengths of the segments of the fourth leg: IV-Leg-1, $76\ \mu$ – $91\ \mu$; IV-Leg-2, $114\ \mu$ – $129\ \mu$; IV-Leg-3, $160\ \mu$ – $197\ \mu$; IV-Leg-4, $194\ \mu$ – $228\ \mu$; IV-Leg-5, $199\ \mu$ – $243\ \mu$; IV-Leg-6, $160\ \mu$ – $167\ \mu$; Figure 1 illustrates the proportions and chaetotaxy of the legs; a few swimming hairs present.

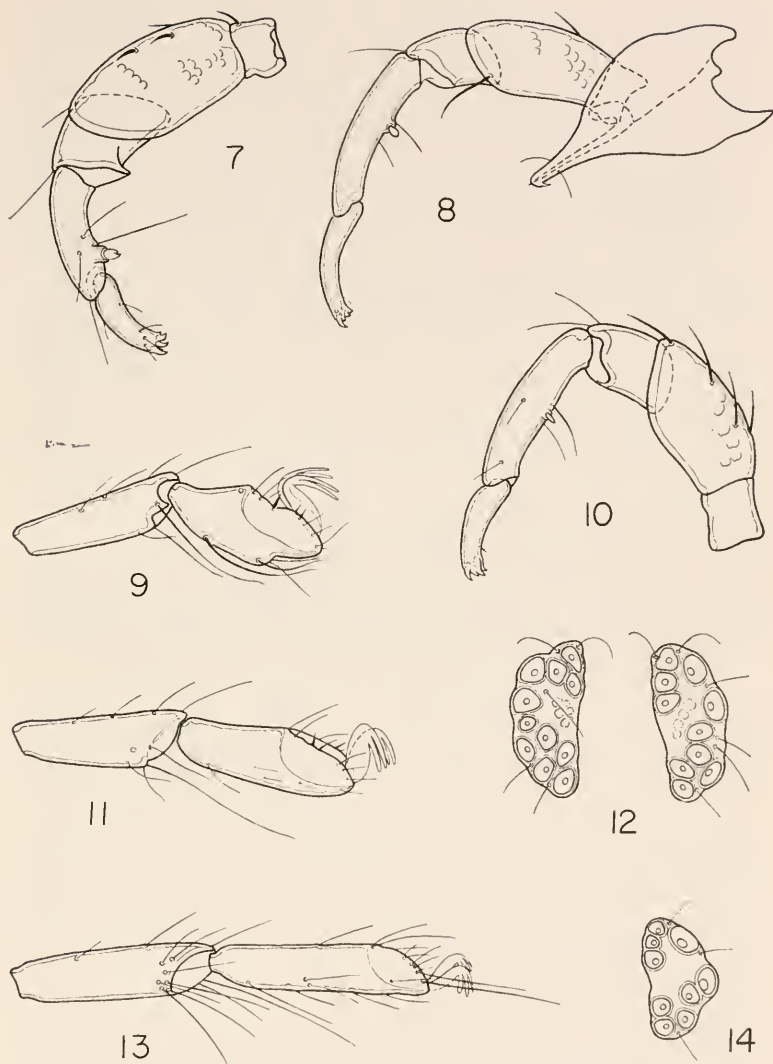
Male: Unknown.

Nymph, Type 1 (Figs. 10, 11, 14): This single specimen was taken in the type locality and, therefore, there seems little doubt but that it belongs to *O. elongatus*.

Body soft and distensible, approximately $940\ \mu$ in length; coxal area similar to that of adult female except fourth coxae are slightly longer and narrower; coxal area $258\ \mu$ in length, $198\ \mu$ in width; genital field lying well posterior to the coxal area; acetabular plates bearing approximately nine acetabula on each side (Fig. 14); gonopore absent; the individual acetabular plates $59\ \mu$ in length, $38\ \mu$ in width.

Capitulum $160\ \mu$ in length, with a well developed rostrum; dorsal lengths of the palpal segments: P-I, $27\ \mu$; P-II, $83\ \mu$; P-III, $39\ \mu$; P-IV, $90\ \mu$; P-V, $50\ \mu$; P-IV proportionally longer than in adult female, peg-like seta located near middle of ventral side (Fig. 10); dorsal lengths of the distal segments of the first leg: I-Leg-4, $92\ \mu$; I-Leg-5, $97\ \mu$; I-Leg-6, $100\ \mu$; greatest height of I-Leg-6, $35\ \mu$; I-Leg-6 not greatly expanded at distal end (Fig. 11); dorsal lengths of the segments of the fourth leg: IV-Leg-1, $69\ \mu$; IV-Leg-2, $91\ \mu$; IV-Leg-3, $137\ \mu$; IV-Leg-4, $156\ \mu$; IV-Leg-5, $171\ \mu$; IV-Leg-6, $141\ \mu$; leg segments somewhat stockier than in adult female.

Nymph, Type 2 (Figs. 8, 9, 12): These two specimens were collected within the known range of *O. elongatus* adults, but not in the same locality. It is very possible that these are male nymphs, which are exhibiting a marked sexual dimorphism. However, until the male of *elongatus* has been found, their true status will remain uncertain.



Omartacarus elongatus n. sp. Female and nymphs.

FIG. 7, palp, female; FIG. 8, palp and capitulum, nymph Type 2; FIG. 9, I-Leg-5 and 6, nymph Type 2; FIG. 10, palp, nymph, Type 1; FIG. 11, I-Leg-5 and 6, nymph Type 1; FIG. 12, provisional genital field, nymph type 2; FIG. 13, I-Leg-5 and 6, female; FIG. 14, acetabular plate, nymph Type 1.

Body soft and distensible, approximately 760μ – 790μ in length; coxal area 258μ – 274μ in length, 198μ in width; coxal area similar to that of preceding nymph; provisional genital field lying well posterior to the coxal area; acetabular plates slightly longer and narrower than in preceding nymph; length of individual acetabular plates 72μ – 76μ , width 35μ ; genital acetabula 10–14 on each side; gonopore absent (Fig. 12).

Capitulum 163μ – 167μ in length, with a well developed rostrum (Fig. 8); dorsal lengths of the palpal segments: P-I, 27μ – 28μ ; P-II, 95μ – 100μ ; P-III, 42μ – 45μ ; P-IV, 111μ – 114μ ; P-V, 73μ – 79μ ; P-II with a relatively heavy seta at distal end (Fig. 8); P-IV proportionally narrower than in adult female, with a peg-like seta on a tubercle near middle of ventral side; P-V proportionally longer and narrower than in preceding nymph (compare Figs. 8, 10); dorsal lengths of the distal segments of the first leg: I-Leg-4, 100μ – 104μ ; I-Leg-5, 110μ – 111μ ; I-Leg-6, 100μ – 104μ ; greatest height of I-Leg-6, 45μ – 47μ ; I-Leg-6 greatly expanded distally (Fig. 9); dorsal lengths of the segments of the fourth leg: IV-Leg-1, 64μ – 69μ ; IV-Leg-2, 84μ – 88μ ; IV-Leg-3, 132μ – 136μ ; IV-Leg-4, 152μ – 160μ ; IV-Leg-5, 167μ – 174μ ; IV-Leg-6, 137μ – 145μ .

Discussion: The two types of nymphs differ as follows. I-Leg-6 of the Type 1 nymph is not greatly expanded distally as is the case in the Type 2 nymph (compare Figs. 9, 11). The Type 1 nymph more closely resembles the adult female in structure of I-Leg-6, although this segment is proportionally much stockier in the nymph. The palps of the two nymphs differ somewhat in proportions and chaetotaxy (compare Figs. 8, 10). The palps of both nymphs differ from the adult female in having P-IV longer and the peg-like seta placed near middle of the segment.

Types: Holotype, adult female, collected in a sand bar in a small stream 100 yards south of Wichita Mts. National Wildlife Refuge approximately five miles north of Indianahoma, Comanche Co., OKLAHOMA, July 14, 1961; Paratypes: one female, same data as holotype; one female, taken in a gravel bar in the Mera-mec River approximately eleven miles northeast of Salem, Dent Co., Missouri, July 1, 1961; one female, taken in a sand and

gravel bar in a small stream within the city limits of Patterson, Wayne Co., Missouri, July 11, 1960.

Since there is some doubt as to the specific placement of the nymphs, they are not assigned to the type series. The Type 1 nymph was collected with the holotype. The two Type 2 nymphs were taken in a gravel bar in a tributary of the Kiamichi River approximately one mile north of Albion, Pushmataha Co., Oklahoma, July 9, 1961.

The holotype will be deposited in the Chicago Natural History Museum, a paratype female will be placed in the United States National Museum.

Further Notes on West African Lycaenidae (Lepidoptera)¹

HARRY K. CLENCH, Section of Insects, Carnegie Museum,
Pittsburgh 13, Pennsylvania

Spindasis (*Lipaphnaeus*) *leonina paradoxa* Schultze

Spindasis paradoxa Schultze 1908, Societas Entomologica 23: 130 (rainforest nr. Kiliwindi (Mungo R. region) and Assam (upper Cross R. region), N. W. Cameroun).

Spindasis leonina paradoxa: Aurivillius 1923, in Seitz, Grossschmett. Erde 13: 416.

Crudaria leonina bitje, ♀ form *paradoxa*: Peters 1952, Checklist Butterflies Ethiop. Reg.: 110.

Male. As in *bitje* except that the fore wing orange patch is smaller, not reaching Cu_2 and with its base only about as wide as $\frac{1}{3}$ the inner margin length. Hind wing tornus with the inner of the two usually inconspicuous silver spots markedly edged with black distally. Underside with basal area a little darker and duller, but not as much as in *l. leonina*; hind wing tornus with a conspicuous black spot in lobe.

Female. As in *bitje*, but with the black edge on the tornal silver spot as in male. Underside with basal yellow about as in *bitje*; tornal black spot as in male.

¹ Published pursuant to work as collaborating investigator on National Science Foundation grant no. G-14048.

This subspecies is in most respects about intermediate between nominate *leonina* Sharpe and *leonina bitje* H. H. Druce, though, on the whole, closer to the latter. I have seen no topotypic or near-topotypic material but a pair, male and female, is before me that agrees in nearly every respect with Schultze's description, from near Mombasa, Kenya (*leg.* W. Doherty). Despite the wide difference in locality I am inclined to consider them one and the same. It is not the first instance of a close link between East Africa and the northwestern Cameroun region.

How Peters ever made a "female form" of this I cannot understand. Schultze described it from two males!

Note. Both M. Henri Stenpffer, of Paris, and Mr. T. H. E. Jackson, of Kitale, Kenya, have expressed (*in litt.*) great doubt regarding the occurrence of *Spindasis leonina* in the Mombasa area. The strong suspicion of mislabelling which their weighty opinion thus raises is, however, tempered by other factors, too numerous and involved to be gone into in this note. Let it suffice to conclude that the record of this characteristic West African rainforest species from the Mombasa region must be considered dubious, but it is not as yet to be rejected outright.

Aphnaeus chapini Holland

This name is not listed by Aurivillius in Seitz (*ca.* 1924, relevant parts), nor in Wallace Peters' 1952 Check List, nor by Stenpffer 1954 (*Aphnaeus* revision).

Similar to *asterius* and, according to Stenpffer, with indistinguishable male genitalia; but sympatric with it (see below) and with the following apparently constant differences:

Upper surface of male brown (not the black of *asterius*), usually without any iridescent scaling at all, but in the West African race with small patches of comparatively dull, pale greenish scaling (not brilliant greenish blue as in *asterius*) on both wings; hind wing tornus broadly orange and the fore wing tornus may also have orange, the tails orange, tipped with white (in *asterius* there is no tornal orange and the tails are black with white tips).

Under surface of male bright orange (not the dark ruddy orange brown of *asterius* males), the markings usually feeble,

though fairly well developed in the West African race; practically identical with those of *asterius*, including even the distobasally streaked postmedian spot in M_2-M_3 of fore wing.

Three rather distinct subspecies are discernible:

***Aphnaeus chapini chapini* Holland**

Spindasis chapini Holland 1920, Bull. Am. Mus. Nat. Hist. 43: 225, pl. 12, fig. 6 (Niagara, prov. Stanleyville, Congo).

Despite the fact that it is located geographically between the other two subspecies, this is an extreme of the three, in the male with the markings below entirely obsolete save for (a) the basal cell spot, middle pair of cell spots and cell-end dash, all on the fore wing, all black without white centers; (b) a grayish inner marginal shade below the fore wing cell and vein Cu_2 , black next to the cell, not reaching termen; (c) a subtornal dash on the hind wing, black with white center, from $2A$ to inner margin, basad of the black tornal lobe; and (d) the faintest trace of a black line, parallel to the last and basad of it. On the upperside agreeing with the next in having an orange tornal suffusion on the fore wing below Cu_2 , lacking any metallic scaling above and with the tails bright orange to their white tips.

The holotype male is in the American Museum of Natural History; a male paratype is in Carnegie Museum (C.M. Ent. type series No. 450).

***Aphnaeus chapini ugandae* Stempffer (new status)**

Aphnaeus asterius subspecies: Stempffer 1954, Trans. R. Ent. Soc. London 105: 516.

Aphnaeus asterius ugandae Stempffer 1961, Ann. Mus. Roy. Afr. Centr. (8°), 94: 59, pl. 4, figs. 7, 8 (Masaka, Sango Bay, Katera, Uganda).

Differs from nominate *chapini* in the more developed pattern below, including in addition to the visible spots in *chapini*, several elements of the fore wing postmedian series, the peculiar, basally elongated, arched member of this series below Cu_2 conspicuously white centered; and chiefly costal and tornal elements

on the hind wing. As in *c. chapini* the upper surface of the male has a conspicuous tornal orange patch on the fore wing and lacks any metallic scaling whatever.

***Aphnaeus chapini occidentalis* new subspecies**

Differs in these particulars (male): underside pattern elements still more developed than in *ugandae*, with the hind wing discal and postmedian elements present (disposed about as in *asterius*), all these markings conspicuously white centered, the black edging prominent only in basal half of fore wing and costal area of hind wing. A conspicuous hind wing element is a transverse bar between $2A$ and inner margin, long, silvery white with a narrow black edging. Surprisingly enough this is not the homologue of the similar bar evident on *c. chapini* below, but rather of the faint black line basad of the latter. The prominent bar in *c. chapini* finds its homologue in *occidentalis* in a more distal, inconspicuous black line of irregular shape, with a few internal white scales. In *ugandae*, according to Stempffer's figure, the inner bar is the larger (as in *occidentalis* but lacks white scaling within. On the upper surface there is no tornal orange on the fore wing and on the hind wing the tornal orange patch does not extend costad of Cu_2 , though well surpassing that vein (where the shorter of the two tails arises) in *c. chapini* and *c. ugandae*. Pale, not particularly lustrous, greenish scaling occurs on the fore wing as a small cuneiform patch in the extreme base of the cell and on the hind wing in the discal area between M_3 and Cu_2 , extending basad as far as, but not into, the cell and distally to within a millimeter or so of the termen, this latter scaling diffuse and patchy.

Length of fore wing: 14, 14.5 mm.

Holotype, male, and one male *paratype*, Efulen, Cameroun, leg. H. L. Weber (C. M. Acc. 8190), respectively 2.iv.1925 and 4.x.1925. C.M. Ent. type series No. 451.

***Cupidesthes paludicola* Holland**

(= *brunneus* Smith & Kirby, NEW SYNONYMY)

Lycacna paludicola Holland 1891, Psyche 6: 52 (Kangwé,

Ogové R., Gabon); Aurivillius 1898, Rhop. Aethiop.: 381 (*species incertae sedis*); *ibid.* 1925, in Seitz, Grossschmett. Erde 13: 496 (*species incertae sedis*).

Lycaenesthes brunneus Smith & Kirby 1893, Rhop. Exot. 2: 106, Afr. Lycaen. pl. 23, figs. 13, 14 (locality not given); *et auctorum*.

Cupidesthes brunneus: Bethune-Baker 1910, Trans. Ent. Soc. London 1910: 13; *et auctorum*.

There is a curious and interesting bit of confusion here, which it is possible to clarify, thanks in great part to the remarks of Smith and Kirby (*loc. cit.*). The events, apparently, were as follows: Holland in 1891 published the description of *Lycaena paludicola*, based on a single specimen. Some time later he sent this specimen (along with material of other species) to Smith and Kirby, who described and figured it as new, believing it to have been unpublished. It had been their intention, apparently, to use for it the "manuscript" name *paludicola* (which was probably on the pin-label), but through an oversight the plate was caused to bear the name *brunneus* and this name they accordingly used in the text, duly noting and apologizing for the slip. For some reason, despite Smith and Kirby's mention of the name, *paludicola* has been an unknown entity ever since. This single specimen, thus, has the unusual distinction of being the holotype simultaneously of both *paludicola* and of *brunneus*. It now bears C.M. Ent. type series No. 452.

It is perhaps worth noting that because of Aurivillius' mention of the name in 1898 and 1925, *paludicola* cannot be considered a *nomen oblitum* and that Art. 23(b) of the *Int. Code Zool. Nomencl.* (1961) is therefore inapplicable.

***Anthene rubricincta* Holland**

(= *musagetes* Holland, NEW SYNONYMY)

Lycaenesthes rubricincta Holland 1891, Psyche 6: 51 (Kangwé, Ogové R., Gabon); Smith & Kirby 1893, Rhop. Exot. 2: 100, Afr. Lycaen. 22, figs. 11, 12; Bethune-Baker 1910, Trans. Ent. Soc. London 1910: 21; Aurivillius 1923, in Seitz, Grossschmett. Erde 13: 438.

Lycænesthes musagetes Holland 1893, Ent. News 4: 25 (Kangwé, Ogové R., Gabon); Bethune-Baker 1910, Trans. Ent. Soc. London 1910: 21, pl. 5, fig. 5.

Lycænesthes (or *Anthene*) *musagetes*: *auctorum*.

The name *musagetes* was based on a male and in the nearly 70 years since its proposal only males have been known.² In contrast, the name *rubricincta* was based on a female (as Auri-villius, *loc cit.*, suspected; Holland erroneously described it as a male), only a few of which—and no males—have ever been found. Comparison of the types of the two names and of considerable supplemental material (including a second female) reveals an almost spot for spot agreement of the under surface pattern. This in conjunction with the similar female of *ituria* (see below) leaves little room for doubt that *musagetes* and *rubricincta* are one and the same species. The types of these names now bear C.M. Ent. type series Nos. 453 (*rubricincta*) and 454 (*musagetes*).

***Anthene ituria* Bethune-Baker**

Lycænesthes ituria Bethune-Baker 1910, Trans. Ent. Soc. London 1910: 22, pl. 1, fig. 4, pl. 5, fig. 6 (Beni, Makala and Mawambe, Congo).

A useful discriminating trait of this species, otherwise very similar to *rubricincta* (= *musagetes*), is the thinner postmedian line below, particularly on the fore wing and the reduced or absent dislocation of M_3 on that wing.

Two nearly topotypic males (Butembo, Kivu Distr., Congo, *leg.* Ch. Seydel) are at hand, as well as a male from Efulen, Cameroun (*leg.* H. L. Weber), a male from Queen Elisabeth Park, Uganda (*ex* T. H. E. Jackson) and two males and a female from Bundibugyo, Bwamba, Uganda (*ex* T. H. E. Jackson).

The female bears, as do males, a strong resemblance to *rubricincta*, and differs from the female of that species in the same

² Farquharson (1922, Trans. Ent. Soc. London "1921": 381) reared a female from the flowers of *Pterocarpus esculenta* (Leguminosae) in southern Nigeria, but gave no description of it.

way as do males: the thinner postmedian line of both wings below, on the fore wing not disjunct at M_3 , on the hind wing tinged with reddish; ground color below darker brown. In addition the purely female trait of large orange terminal patch on hind wing above also differs slightly, being rather thicker in the middle, very nearly attaining the cell-end in the vicinity of M_3 and Cu_1 .

A Preliminary Study of the Acaridiae (Acarina, Sarcoptiformes) of Colorado

P. R. P. PILLAI and PAUL W. WINSTON,¹ Department of Biology, University of Colorado

Despite the economic importance of many members of the supercohort Acaridiae, little work has been done on the group in the United States. For this reason, a preliminary list of the species found in Colorado will be useful even though the acarid fauna of the region is very sparse. The relatively few specimens which we are recording are in the Acarology Collection of the University of Colorado. Specimens were collected from more than 500 samples (chiefly soil extractions) utilizing standard methods. These samples were from many parts of the state, but the bulk of our records are from Boulder County.

Major contributions to the taxonomy of this group have been made by Michael (1901), Oudemans (1924 and 1927), Zakhvatkin (1959), Vitzthum (1943), and Nesbitt (1945), but the most recent and comprehensive treatment of the subject is by Hughes (1961). In this paper, we have followed the last author's system as far as possible.

ACARIDAE Ewing and Nesbitt, 1942.

Acaridae Ewing and Nesbitt, *Proc. Biol. Soc. Wash.* 55: 121, 1942.

TYROPHAGUS Oudemans, 1923.

Tyrophagus Oudemans, *Ent. Ber.* 6: 250, 1923.

Tyrophagus putrescentiae (Schrank)

Acarus putrescentiae Schrank, *Enum. Insect. Austr.* #1057, 1781.

¹ This work was supported by a grant to the Acarology Collection from the Council on Research and Creative Work of the University of Colorado.

Tyrophagus castellanii Hirst, *J. Trop. Med.* 15: 374, 1912.

T. noxius Zakhvatkin, *Inst. Zool. Acad. Sci.*, Moscow 28: 1, 1941.

T. brauni Turk and Turk, *Beitr. Syst. Ökol.* 1: 1, 1957.

T. putrescentiae (Schränk, 1781) Hughes, Min. Agric., London, Tech. Bull. #9, 1961.

Average length of idiosoma: male, 310 μ ; female 350 μ .

Twenty specimens, both males and females, were obtained from a cockroach culture maintained on "Lab Chow" in the Dept. of Entomology, Colorado State University, Fort Collins, Larimer Co.

***Tyrophagus longior* (Gervais)**

Tyroglyphus longior Gervais, *Walkenaer, Hist. Nat. Inst. Apt.* 3: 262, 1844.

Tyrophagus tenuiclavus Zakhvatkin, *Inst. Zool. Acad. Sci.*, Moscow 28: 1, 1941.

T. longior (Gervais, 1844) Hughes, Min. Agric., London, Tech. Bull. #9, 1961.

Average length of the idiosoma: male, 420 μ ; female, 550 μ .

More than 30 specimens were obtained from mixed wild grass sod, 0-6" deep, three miles west of Louisville, Boulder Co.;² from the upper 12" soil and litter under a lodgepole pine stand near Science Lodge, Ward, Boulder Co. (9,000'); and from damp sod, 0-4", in creek bottom in lower Left Hand Canyon, Jamestown, Boulder Co. (6,000').

The males differ slightly from Hughes' (1961) description in the position of the *r* and *w* setae of tarsus IV which lie almost on a level with the distal suckers.

***Tyrophagus dimidiatus* (Hermann, 1804 (not found))**

T. infestans Berlese (from Turk and Turk, *Beit. Syst. Ökol.* 1: 1, 1957).

T. oudemansi Robertson, *Aust. J. Zool.* 7: 146, 1959.

T. dimidiatus (Hermann) Hughes, Min. Agric., London, Tech. Bull. #9, 1961.

² Where altitudes are not indicated, they are approximately 5500'.

Length of the idiosoma: male, 400 μ .

Only one male was obtained from a garden compost heap three miles west of Louisville, Boulder Co. Repeated collections in the same place have failed to turn up additional specimens.

The lack of a truncate tip to the penis is the only important difference from Hughes' (1961) description.

Tyrophagus palmarum Oudemans, *Ent. Ber.* 6: 317, 1924.

T. perniciosus Zakhvatkin, *Inst. Zool. Acad. Sci.*, Moscow 28: 1, 1941.

T. palmarum (Oudemans) Hughes, *Min. Agric.*, London, *Tech. Bull.* #9, 1961.

Length of idiosoma: female, 450 μ .

One female was found in decaying litter in a hay-storage area three miles west of Louisville, Boulder Co. No more specimens have been found despite repeated collections at the site.

This specimen differs from Hughes' description in having the supracoxal seta broad at the base with prominent spines and seta ω_1 expanded distally.

CALOGLYPHUS Berlese, 1923.

Caloglyphus Berlese, *Redia* 15: 262, 1923.

Caloglyphus berlessei (Michael)

Tyroglyphus berlesci Michael, *Ray Soc.*, London 2: 116, 1903.

T. mycophagus Berlese (non Megnin, 1874) *Acari, Myriapodi, e Scorpioni Italiani*, Padova 58: 1, 1891.

Caloglyphus rodionovi Zakhvatkin, 25—*bulleri*, *Volushinsk*, 1935.

C. berlessei (Michael, 1903) Hughes, *Min. Agric.*, London, *Tech. Bull.* #9, 1961.

Length of idiosoma: male, 830 μ .

One specimen, a male, was obtained from soil under a stand of *Pinus contorta*, near Science Lodge, Ward, Boulder Co. (10,000').

The present specimen differs from Hughes' (1961) description in the length of the *sc e* seta which is only two and a half times that of *sc i*; d_2 is equal to d_1 and pa_2 is about two and a half times pa_1 . A more striking difference is the absence of falcate setae on tarsi I and II.

Caloglyphus anomalus Nesbitt, *Canad. Ent.* 76: 21, 1944.

This mite is especially interesting because it is one of the two species of the genus in which there are no anal suckers in the male. The species was described by Nesbitt in 1944, but is here redescribed in the modern terminology of Hughes (1961).

The homeomorphic male averages $750\ \mu$ in length; the body is smooth, colorless with brown appendages; propodosomal dorsal shield with a slightly concave posterior edge; lateral margin slightly narrowed at the middle; *Vi* setae not extending beyond the chelicerae; scapular setae situated in such a way that the distance between the two *sc i* setae is greater than the distance between *sc i* and *sc e* on one side; *sc e* at least six times as long as *sc i*; supracoxal setae small, knob-like, only visible in well-cleared mounts; epimeral plates well visible; d_2 about twice as long as d_1 , d_3 and d_4 definitely longer than the first, d_3 not reaching the base of d_4 ; *la* and *hi* slightly longer than d_1 ; only two pairs of anal setae; pa_2 nine to ten times longer than pa_1 ; anal suckers absent; penis either bent or rounded at the tip; tarsi almost equal to the combined length of the two preceding segments. There are distal suckers on the tarsi of legs IV.

Tarsus I: ω_1 slender and expanded slightly at the extremity, ϵ arising from the same depression as ω_1 , *ba* pointed, but *la* and *wa* are spinous; ω_2 slender, of even diameter, not extending beyond claw; *e* spinous while *f* and *ra* are falcate; ventral setae of genu not pectinate; σ_1 almost one and a half times σ_2 in length.

The heteromorphic males average $720\ \mu$ and the body colors are the same as that of the homeomorphic males; *sc i* about one-fourth of *sc e*, setae in general longer than in homeomorphic males; d_3 extending slightly beyond base of d_4 ; leg III stout ending in a prominent claw, caruncle absent, base of claw with three long and two shorter setae besides a thick spine on its preaxial side; tarsus shorter than combined length of tibia and genu.

Females average $950\ \mu$ and the body is more rounded than that of the males; setae of the dorsal surface relatively shorter than in the male; d_2 about two and a half times as long as d_1 ; pa_1 and pa_2 almost equal, pa_3 absent; genital orifice large, between coxae III and IV.

More than 100 specimens from a large culture maintained in this laboratory have been examined. Nesbitt's (1944) description differs from the above in the following aspects: *Vi* extends beyond the chelicerae, *sci* is one-fourth the length of *sc e*, and the tarsi are longer than the combined length of the two preceding segments.

A large number of specimens of all forms was obtained from decaying meat on the soil in a terrarium in the amphibian cold-room of this Department and from enchytraeid cultures originally obtained from a pet store. The original sources of these two populations are unknown. Nesbitt's specimens were obtained from decaying lily bulbs.

SCHWIEBIA Oudemans, 1916.

Schwiebia talpa Oudemans, *Ent. Ber.* 4: 265, 1916.

S. pachyderma Zakhvatkin, *Inst. Zool. Acad. Sci.*, Moscow, 28: 1, 1941.

S. talpa (Oudemans) Hughes, *Proc. Zool. Soc.*, London, 129: 293, 1957.

Average length of the idiosoma: female, 520 μ .

More than 50 specimens have been examined from the decaying, subterranean parts of plants at Caribou, above Nederland, Boulder Co., and from the sod of a grass, *Bouteloua gracilis*, at the south base of Four-Mile Mesa, north of Boulder, Boulder Co. However, no males have been found. The first-named site is above 10,000' and is relatively moist while the latter is at 5800' in the relatively dry conditions of the low foothills.

The specimens in the present collection differ from Hughes' (1961) description in the complete absence of d_3 and lp setae and in the shape and position of ω_2 . A few specimens were obtained with σ_1 and σ_2 of almost equal length. This variability was noted by Hughes (1961) for the species.

GLYCYPHAGUS Hering, 1838.

Glycyphagus Hering, *Nov. Act. Acad. Leop.* 18: 619, 1838.

Glycyphagus destructor (Schrank)

Acarus destructor Schrank, *Enum. Insect. Austr.* #1057, 1781.

A. spinipes Koch, *Dtsch. Crust., Myriop., Arachn.* 33: 1, 1841.

- Lepidoglyphus cadaverum* Schrank, 1781 (Turk and Turk, *Beitr. Syst. Ökol.* 1: 1, 1957).
Glycyphagus anglicus Hull, *Trans. North. Nat. Union* 1: 37, 1931.
G. (Lepidoglyphus) destructor Schrank, 1781 (Zakhvatkin, *Bull. Soc. Nat.*, Moscow 45: 265, 1936).
G. destructor (Schrank) Hughes, *Min. Agric.*, London, *Tech. Bull.* #9, 1961.

Average length of the idiosoma: male, 350 μ ; female, 385 μ .

Six males and three females were collected in a culture of *Tenebrio molitor* maintained on wheat in this building. Boulder, Boulder Co.

ANOETIDAE Oudemans, 1904.

Anoetidae Oudemans, *Ent. Bericht.* 2: 191, 1904.

HISTIOSTOMA Kramer, 1876.

Histiostoma Kramer, *Arch. Naturg.* 42: 28, 1876.

Histiostoma feroniarum (Dufour)

Hypopus feroniarum Dufour, *Ann. Soc. Nat. Zool.*, Ze Serie, 11: 278, 1839.

H. dugesi Claparede, *Z. wiss. Zool.* 18: 505, 1868.

Tyroglyphus rostro-serratum Megnin, *J. Anat.*, Paris 9: 369, 1873.

Acarus mammularis Canestrini and Fanzago, *Atti Acad. Sci. ven.-trent.-istr.* 5: 140, 1876.

Histiostoma sapromyzae Cooreman, *Bull. Mus. Hist. Nat. Belg.* 20: 1, 1944.

H. feroniarum (Dufour) Hughes, *Min. Agric.*, London, *Tech. Bull.* #9, 1961.

Average length of the idiosoma: the male, 310 μ ; the female, 420 μ .

Twenty-four mites of both sexes were examined from a collection of dead and decaying earthworms on muddy soil, Boulder, Boulder Co. Hughes (1961) mentions that all anoetid mites are found on wet decomposing vegetable matter, but this species appears to thrive, in culture, on decaying meat.

The number of species in this collection is limited, for, as one might expect, Colorado is not rich in free-living Acaridae because so many of the species of this cohort are associated with

decaying food materials, which must be moist. The low humidity and very high evaporating power of the air in Colorado (because of the altitude) cause such rapid changes in available sites that the mites are unable to survive in many places. A mass of decaying organic matter, in any but the most protected and enclosed situations, will usually dry up before decay has progressed very far. If acarid mites do become established on a substrate it is always possible for the entire colony to be wiped out in a few hours of low humidity, and their high cuticular permeability makes migration hazardous except in the hypopus stage. Consequently, suitable habitats for these mites are separated in space and time—very widely during the drought years. Thus, a decaying mass may not be colonized while it is in the proper condition simply because of the lack of available mites in the vicinity. Undoubtedly, the species that we have found have either been carried through the dry years in a few areas of damp soil or have been reintroduced periodically from more humid areas outside the state. It is no wonder that the acarid mites are not considered to be pests of stored food products in Colorado as they are in many other parts of the world.

REFERENCES

- HUGHES, A. M. 1961. The mites of stored food. London, Ministry of Agric., Fisheries, and Food, Tech. Bull. #9.
MICHAEL, A. D. 1901. British Tyroglyphidae I. Ray Soc., London.
——. 1903. British Tyroglyphidae II. Ray Soc., London.
NESBITT, H. H. J. 1945. Canad. J. Res., D. 23: 139-188.
OUDEMANS, A. C. 1924. Ent. Ber. 6: 226-235.
——. 1927. Ent. Ber. 7: 242-247.
VITZTHUM, H. GRAF. 1943. Brons Tierreich 5: 1-1011.
ZAKHVATKIN, A. A. 1959. Fauna of the U. S. S. R. Arachnoidea, Tyroglyphoidea (Acari). Washington, American Institute of Biological Sciences. Transl. from the Russian.

Nomenclature Notice. Validations proposed: of *rostrata* (*Aelia*) *Boheman*, 1852 (Hemip.) Z.N.(S.) 1490; of *Tetrastichus* *Haliday*, 1844 (Hym.) Z.N.(S.) 1503; and of **PHASMIDAE** (Orth.) Z.N.(S.) 1167. Send comments in duplicate by March 10 to Int. Comm. Zool. Nomen., c/o British Museum (N.H.), Cromwell Road, London S.W. 7, England. (See Bull. Zool. Nomencl., Vol. 19, Pt. 5.)

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Pacific Insects

A quarterly journal on the systematic entomology and zoogeography of the Pacific, East Asia, Australia and Antarctica.

Vols. 1-3 (over 500 pages per volume) each \$5.00
Vol. 4 (1962) (over 700 pages) \$7.00

Pacific Insects Monographs

Adjunct series appearing irregularly and not included in subscription. To be ordered separately or standing order placed.

- 1A. **The Chrysomelidae (Coleop.) of China and Korea. Part I.** By Gressitt and Kimoto. 299 pp., 75 figs. \$4.00
2. **Problems in the Zoogeography of Pacific and Antarctic Insects.** By Gressitt, with appendices by Maa, Mackerras, Nakata, and Quate. 128 pp., 40 figs. (incl. 2 color pls.). Bound, \$2.50. Paper, \$2.00

Order from: Bishop Museum, Honolulu 17, Hawaii.

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and Aedes aegypti and Culex quinquefasciata

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 17

A TAXONOMIC STUDY OF THE MILLIPED FAMILY SPIROBOLIDAE (DIPLOPODA: SPIROBOLIDA)

By William T. Keeton

147 pages of text, 37 tables, 2 maps, 18 plates,
table of contents and index

Spirobolid millipeds are probably the most widely known Diplopoda in the United States, being used in many college courses; yet the family has been little studied. This monograph brings together existing knowledge of the group for the first time, and adds much new information gained from critical study of series. The taxonomic history of the family is outlined. External morphology is briefly treated, with emphasis on characters utilized in classification. A summary of current knowledge of life histories is included. The family is redefined, and each genus and species is treated in detail. Particular attention is given to variation and distribution, both of which become more meaningful biologically as a result of synonymizing many species names. Possible phylogenetic relationships of the genera are discussed, and keys to all taxa are provided, with most diagnostic characters illustrated in 18 plates or summarized in 37 tables.

Price \$5.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

ENTOMOLOGICAL NEWS

MARCH 1963

Vol. LXXIV

No. 3

CONTENTS

Richards—Giant sperm in the cockroach	57
Krombein—A new Nitelopterus (Hym., Sphecidae)	61
Cook—Studies on phreaticolous water mites	63
Betrem—A new subgenus of Campsomeris	70
Wray—Larval rash of the American dagger moth	72
Reinhard—New American Sarcophagidae	75

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to *Entomological News*, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

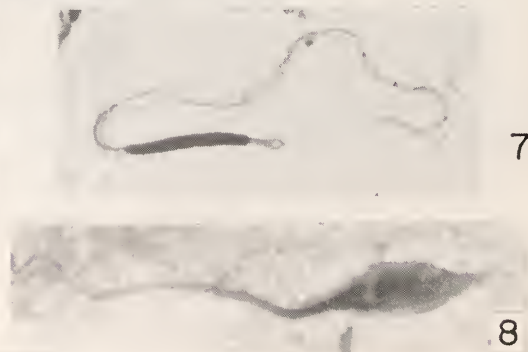
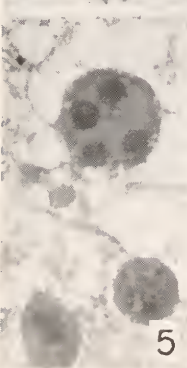
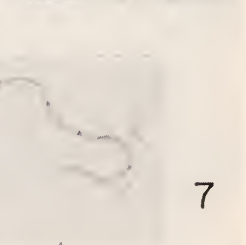
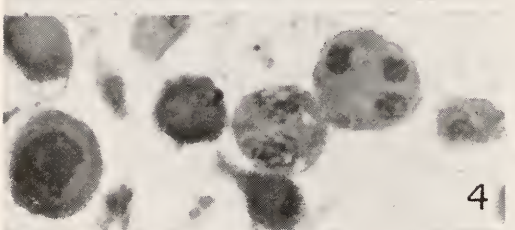
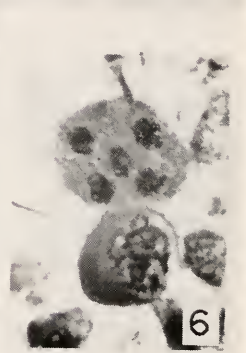
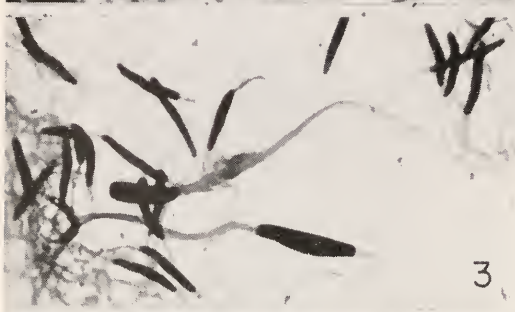
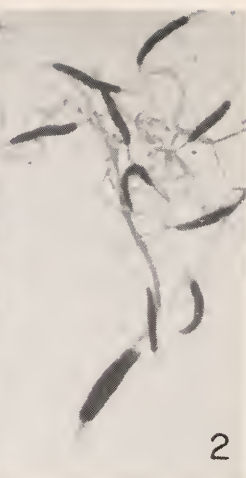
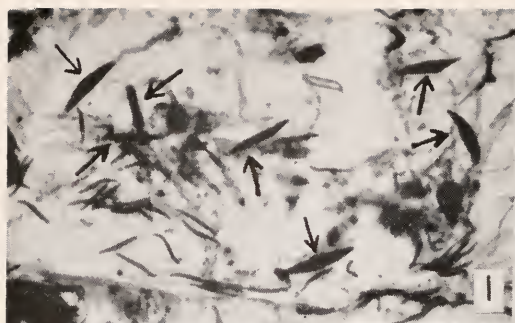
SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.



ENTOMOLOGICAL NEWS

VOL. LXXIV

MARCH, 1963

No. 3

Giant Sperm in the Cockroach, *Periplaneta americana*¹

A. GLENN RICHARDS, Department of Entomology, Fisheries, and Wildlife, University of Minnesota

In the course of making determinations of the speed of swimming of sperm of *Periplaneta americana* (Richards, 1963) we repeatedly noticed that in some preparations there were a few or many spermatazoans approximately two or more times the usual size. These larger sperm were fully motile and as best we could judge from microscopic observation swam as well and at about the same speed as those of normal size.

EXPLANATION OF PLATE

FIG. 1. Longitudinal section of testis of an adult *Periplaneta americana*. Seven giant spermatazoa are indicated by arrows among approximately fifty normal-sized sperm in the field. Magnification 540 ×.

FIG. 2. Smear from seminal vesicle of an adult showing one giant and nine normal-sized sperm. Magnification 860 ×.

FIG. 3. Another smear from a seminal vesicle showing two giants and about twenty normal-sized sperm. Note that not only is the head of the giants larger but that the tail has more than two times the diameter but about the same length as tails of normal sperm. Magnification 860 ×.

FIG. 4. Smear from testis of a 10th instar larva showing uni-, bi- and trinucleate spermatids. Magnification 860 ×.

FIG. 5. Another place on same smear showing quadrinucleate spermatid. Magnification 860 ×.

FIG. 6. Another place on same smear showing quintanucleate spermatid. Magnification 860 ×.

FIG. 7. Normal-sized sperm from adult to show duck-bill type of acrosome (front piece) and tail which in unfavorable saline solutions frays into a number of fibrils. Magnification 1330 ×.

FIG. 8. Giant spermatid from 10th instar larva in process of transforming into a spermatozoan. Magnification 860 ×.

¹ Paper No. 5024, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

To examine this situation further both serial sections and smears were made from testes of individuals ranging in age from sixth instar to adult and from seminal vesicles and seminal receptacles of adults. Material to be sectioned was fixed in Bouin's fluid, embedded in paraffin, sectioned at 8μ , and stained with Heidenhain's iron alum hematoxylin. For smears, the testes or seminal vesicles were smashed in a drop of saline solution on a microscope slide, the excess fluid drained off, preliminarily fixed with the fumes of acetic acid for five minutes, and then flooded with 95% ethanol containing 5% propionic acid. In a few cases the fumes of osmic acid were used for the preliminary fixation. Smears were stained with either Heidenhain's or Delafield's hematoxylin without being air dried.

The normal spermatazoan of a cockroach is a greatly elongated structure, as are the sperm of most insects. They are about 85μ in length, and consist of a blunt frontpiece or acrosome shaped something like a duck's bill and about 3μ long, a head containing the nucleus about $12 \times 1.5\mu$, and a long tail (Figs. 2-3). All sperm tails that have been examined by electron microscopy consist of nine pairs of microfibers arranged in a circle around two larger central microfibers (e.g., Afzelius, 1959). The same is true for cilia and flagella. Presumably the same will be found to be true for cockroach spermatazoa because after mixing with a non-optimal saline solution the tails split or fray into a variable number of small fibers (Fig. 7).

If one makes smears from testes of the American cockroach a variable number of sperm much larger than normal are found (Fig. 1). This is true even with individuals as young as the 6th instar larva although at this stage there are few mature sperm and the giants are recognized as overly large spermatids in the process of transforming to spermatazoa (Fig. 8). The percentage of giants ranges in different preparations from zero to about 30%. If smears are made from the seminal vesicles of males or the seminal receptacles of females, however, a much lower percentage of giants is found, the range being 0-2% (Figs. 2-3).

The giant sperm are approximately the same length as normal-sized ones but the head is larger ($15-20 \times 2-3 \mu$) and the tail is 2-3 times as large in diameter (Fig. 3). A very few sperm were seen which were about double the size of the giant ones shown in the photographs herewith.

These giant sperm would seem to have to be either swollen normal sperm or diploid (or higher level of ploidy). There are two reasons for suggesting that these giants are either multinucleate or diploid or other higher degrees of polyploidy. First, examination of living sperm preparations with an interference microscope showed that the mass of the head of the giants was 2-3 times as great as that of the head of normal-sized sperm. This is opposed to the idea that the giants are normal sperm that have somehow become swollen; it supports the idea that the giants have heads containing two or more nuclei or a polyploid nucleus. Second, examination of smears from testes of larvae show many cells with one or two nuclei, a few with three nuclei, and rare ones with four, five or six nuclei (only two cells were seen with five nuclei and a single one with six nuclei among the thousands examined). Such spermatid cells with 1, 2, 3, 4 or 5 nuclei are shown in Figures 4-6. In a few cases multinucleate spermatids (3-5 nuclei) were seen in the process of transforming into spermatozoa; this would suggest that at least some of the giant sperm are multinucleate rather than diploid or polyploid.

The discrepancy in number of giants seen in smears of testes (up to 30%) in contrast to the numbers in semen from seminal vesicles of males or seminal receptacles of females (<2%), suggests that most of these abnormal sized sperm never leave the testes. Presumably they disintegrate there and are resorbed.

Polyploid sperm and other forms of unusual spermatogenesis are well-known among insects. Hughes-Schrader (1948) gives a classification of the types found among coccids. Diploid sperm and abnormal giant sperm are said to be common in the males of the normally parthenogenetic walking stick, *Carausius morosus* (Bergerard, 1962). And in pentatomid bugs

there is one or more abnormal lobes in the testes, these abnormal lobes producing only abnormal spermatids that may be either giant or dwarf (Schrader, 1960). The giant spermatids give rise to giant sperm, the dwarf spermatids disappear.

Schrader (1960) suggests that the giant sperm of pentatomid bugs participate in fertilization only to the extent of adding to the number of supernumerary sperm that are commonly found in insect eggs. These supernumery sperm within the egg disappear, presumably they disintegrate and add to the amount of nutritive material in the egg. I have no idea what happens to the giant sperm in the American cockroach but since they can be found in the semen in the seminal receptacles of adult females they presumably can participate in fertilization. What might happen within the egg is unknown but if they are multinucleate rather than containing a polyploid nucleus they could conceivably supply a male pronucleus for fertilization. This would not be easy to ascertain.

REFERENCES CITED

- AFZELIUS, B. 1959. Electron microscopy of the sperm tail. *J. Biophys. Biochem. Cytol.* 5: 269-278.
- BERGERARD, J. 1962. Parthenogenesis in the Phasmidae. *Endeavour* 21: 137-143.
- HUGHES-SCHRADER, S. 1948. Cytology of coccids. *Adv. Genetics* 2: 127-203.
- RICHARDS, A. G. 1963. The rate of sperm locomotion in the cockroach *Periplaneta americana* as a function of temperature. (In press.)
- SCHRADER, F. 1960. Evolutionary aspects of aberrant meiosis in some Pentatominae. *Evolution* 14: 498-508.

A New *Nitelopter* from Wyoming and Washington (Hymenoptera, Sphecidae)

KARL V. KROMBEIN, Entomology Research Division,
Agricultural Research Service, U. S. Department
of Agriculture, Washington 25, D. C.

This striking new species is described at this time to provide a name for use by Dr. H. E. Evans of the Museum of Comparative Zoology, who wishes to publish some biological notes and a description of the larva. I take pleasure in naming it for its prospective biographer.

Nitelopter *evansi*, new species

The moderately large size and dark blue abdomen of the female remind one at once of the female of the Coloradan *cyanurus* (Rohwer). However, in that species the front is not strongly bulging, the flagellar segments are all considerably longer than wide, the postocellar and ocellocular lines are subequal, and the scutum lacks a shallow median trough on the anterior two-thirds. The female type of *N. maurus* (Rohwer) from Colorado seems to be the most closely related of the known Nearctic species. It agrees with *evansi* in the bulging front and short flagellar segments, but has a black abdomen, is considerably smaller (3.7 mm long), apparently lacks the median trough on scutum (the pin obscures most of this area), and differs in several measurements as detailed in the following description.

The male of *evansi* is unknown. Dr. Evans collected two large *Nitelopter* males with blue abdomen, and a smaller female with blue abdomen at the type locality of *evansi*. The female appears to be another undescribed species. The genitalia of the male agree perfectly with those of the allotype of *cyanurus*, and the sculpture and relative measurements are very close. I have no hesitancy identifying them as conspecific. I believe that the two sexes of *cyanurus* are correctly associated; in the male the flagellar segments are longer than I would expect them to be in *evansi*, the front is not bulging, and the postocellar and ocellocular lines are equal as in female *cyanurus*, rather than having a ratio of 2.6:1 as in female *evansi*.

Type. ♀; Jackson Hole Biological Station, Moran, WYOMING, 6750 ft. elev.; July 16–30, 1961 (H. E. Evans; biol. note 1772) [U. S. National Museum, Type No. 66584].

Female. Length 5.3 mm, forewing 3.6 mm. Black; abdomen above dark blue; first five terga narrowly testaceous at apex; apical half of mandible dark red; wings clear except the forewing infumated beyond cells, the veins dark brown. Vestiture entirely appressed, rather inconspicuous, silvery, only first tergum with a complete band, the succeeding terga more noticeably pubescent laterally.

Head subcircular in frontal view, the width 1.1 times the height, and 1.9 times the median width of face (2.1 times in *maurus*); face dull, granulate, strongly bulging both as viewed from above and from side, with an evanescent median furrow on upper half which is continued on lower half as a narrow polished streak; eyes converging above as in *maurus*, the interocular distance across antennal insertions 1.3 times the least interocular distance across vertex; ocelli in a nearly equilateral triangle, lower part of anterior ocellus and outer edges of lateral ocelli depressed below surface of front, the ocellar triangle with a shallow longitudinal furrow behind anterior ocellus; posterior ocellar line (POL) 2.6 times the ocellocular line (OOL) (2.1 times in *maurus* and subequal in *cyanurus*), the former 1.2 times the distance between anterior ocellus and a posterior ocellus (SOL) (1.5 times in *maurus*); antennae short and thick, the first flagellar segment 1.4 times as long as second, the segments beyond the fourth not much longer than their width.

Dorsum of thorax dull, very finely and closely punctate; pronotum short, posterior margin with a narrow groove except on sides; scutum with a shallow, moderately broad trough on anterior two-thirds; propodeum somewhat shining, the dorsum 1.4 times as long as posterior slope (1.3 in *maurus*), and with a strong median carina and close oblique rugulae on either side of the carina, the lateral surface obliquely and closely rugulose, the posterior surface with a median cuneate impression and transverse rugae.

Fore tarsal comb well-developed, consisting of three bristles on basitarsus, and one each on the following two segments.

Forewing with distance from outer corner of second submarginal cell to apex of wing 1.1 times the width (1.2 times in *maurus*).

Male. Unknown.

Paratypes. 7 ♀♀; same data as type [MCZ, USNM]. 1 ♀; Columbia River near Vantage, Grant Co., Washington; August 27, 1954 (H. E. and M. A. Evans) [USNM]. The paratypes are 4.3 to 4.7 mm long, and agree in all significant details with the type.

Studies on the Phreaticolous Water Mites of North America: New or Unreported Genera of Mideopsoidea and Acalyptonotoidea¹

DAVID R. COOK, Wayne State University, Detroit, Michigan

Collections² made in phreaticolous habitat, the so-called subterranean waters, in western North America during the summer of 1961 yielded new species of *Chappuisides* Szalay, *Uchidastygacarus* Imamura, and a new genus which is tentatively assigned to the family Mideopsidae. Holotypes and allotypes will be placed in the Chicago Natural History Museum.

YACHATSIA new genus

Diagnosis: (based on male only) dorsal and ventral shields present; dorsal shield bearing four pairs of glandularia; first and second coxae projecting beyond the body proper; a ridge present on each side extending anterolaterally from the insertions of the fourth legs; fourth coxae touching medially for a relatively long distance (Fig. 7); genital field with three pairs of genital acetabula; gonopore of male very narrow; first and

¹ Contribution No. 89 from the Department of Biology, Wayne State University.

² Supported by a grant (G-9042) from the National Science Foundation.

second acetabula elongated and lying in the opening of the gonopore; third acetabula rounded and excluded from the gonopore (Fig. 11); a pair of glandularia flanking the genital field; P-IV and P-V fused but suture line between them slightly indicated (Fig. 16); ventral side of P-IV without setal tubercles; legs unmodified; swimming hairs absent; claws present on all legs.

Genotype: Yachatsia mideopsoides n. sp.

Discussion: The new genus is tentatively placed in the Mideopsidae but the final decision must await the finding of the female. *Yachatsia* differs from *Mideopsis* in possessing a four-segmented palp, and in having the third pair of genital acetabula excluded from the gonopore (Fig. 11).

***Yachatsia mideopsoides* new species (Figs. 7, 8, 10, 11, 15, 16)**

Male: Ventral shield, including first coxae, 460 μ in length, 304 μ in width; ventral shield oval, first and second coxae projecting; tips of first and second coxae pointed, edges somewhat serrated; suture lines between coxae slightly indicated; capitular bay relatively small; fourth coxae touching medially for a relatively long distance (Fig. 7); fourth legs inserted slightly anterior to middle of body; a well-developed ridge present on each side extending anterolaterally from the insertions of the fourth legs; genital field with three pairs of genital acetabula, first and second pair elongated, third pair more or less rounded; gonopore slit-like, widening slightly in area of first and second pair of acetabula; third pair of acetabula lying at posterior end of genital field, excluded from the gonopore; two rows of setae and a pair of glandularia flanking the gonopore (Fig. 11); excretory pore lying on the ventral shield; dorsal shield oval, 418 μ in length, 269 μ in width; dorsal shield bearing four pairs of glandularia; a pair of longitudinal depressions extending posteriorly from the region of the postocularia.

Dorsal lengths of the palpal segments: P-I, 15 μ ; P-II, 28 μ ; P-III, 19 μ ; P-IV and P-V fused, combined length 52 μ ; suture line between P-IV and P-V slightly indicated (Fig. 16); P-IV portion 31 μ in length, P-V portion 21 μ in length; setal tubercles absent from P-IV portion; P-V portion with a large, curved

dorsal seta; Figure 16 illustrates the chaetotaxy of the palp; capitulum (Fig. 8) $62\ \mu$ in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, $52\ \mu$; I-Leg-5, $62\ \mu$; I-Leg-6, $76\ \mu$; Figure 15 illustrates these segments; none of the legs modified; swimming hairs absent on all legs.

Female: Unknown.

Types: Holotype, adult male, taken in a sand and gravel bar in Ten Mile Creek approximately seven miles south of Yachats, Lane Co., OREGON, August 13, 1961.

Discussion: See discussion under generic description.

Chappuisides eremitus new species (Figs. 1, 2, 9, 13, 14)

Female: The specimen to be described is newly metamorphosed and sclerotization of the dorsal and ventral shields is probably not complete. The two small sclerites, each bearing a pair of long setae, which flank the excretory pore, would probably have been incorporated into the completed ventral shield. Ventral shield, including first coxae, $692\ \mu$ in length, $562\ \mu$ in width; first and second coxae projecting, capitular bay more or less V-shaped; first coxae fused medially, suture line between them obliterated; a curved ridge present on each side extending anterolaterally from the insertions of the fourth legs; a pair of glandularia at medial end of suture lines between third and fourth coxae; posterior portion of fourth coxae separated into a genital bay; well developed flaps present which cover attachments of fourth legs as seen in ventral view; genital field obovate, much narrower anteriorly (Fig. 1); genital field $155\ \mu$ in length, $117\ \mu$ in width; three pairs of genital acetabula present, these lying in posterior two-thirds of gonopore; genital field flanked by three or four small setae; excretory pore fused with the ventral shield; setal plates flanking the excretory pore free in the integument in this specimen, but probably fused with ventral shield in fully sclerotized specimens; dorsal shield $654\ \mu$ in length, $471\ \mu$ in width; dorsal shield bearing four pairs of glandularia; setae of dorsum very long (Fig. 2); pigmented eyes present; integument without pigment.

Dorsal lengths of the palpal segments: P-I, $14\ \mu$; P-II, $55\ \mu$;

P-III, $26\ \mu$; P-IV, $55\ \mu$; P-V, $29\ \mu$; lateral side of P-II with three long setae; distoventral portion of P-IV drawn out into rounded projection to form an uncate palp (Fig. 14); capitulum (Fig. 9) $114\ \mu$ in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, $104\ \mu$; I-Leg-5, $124\ \mu$; I-Leg-6, $142\ \mu$; Figure 13 illustrates I-Leg-5 and 6; swimming hairs absent.

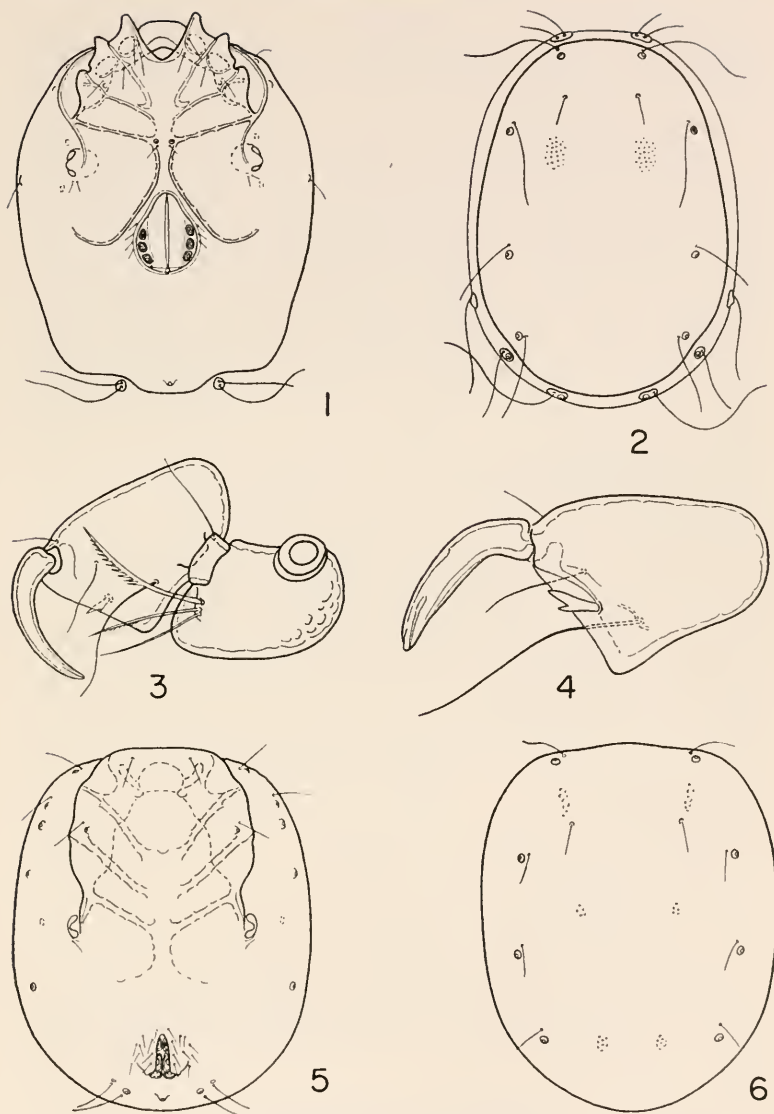
Male: Unknown.

Types: Holotype, adult female, collected in a sand and gravel bar in the Gibbon River above Virginia Cascades, Yellowstone National Park, WYOMING, September 1, 1961.

Discussion: Three species of *Chappuisides* have previously been reported from the ground waters of Europe. *C. hungaricus* was named by Szalay (1943) from specimens collected in Roumania. Schwoerbel (1959) states that this species is also known from Switzerland, the Pyrenees region, and Germany. A second species, *C. ellipticus*, was described by Walter (1947) from Switzerland, and a third species *C. thienemanni* was described by Motas (1959) from Roumania. The North American species resembles *C. thienemanni* in the narrowing of the anterior end of the gonopore. The new species differs in having the anterior portion of the gonopore even more narrowed, possessing smaller genital acetabula which do not extend as far forward in the gonopore, and in having a more or less V-shaped capitular bay.

Uchidastygacarus imamurai new species (Figs. 3, 4, 5, 6, 12)

Male: The measurements of the paratype male are given in parentheses following the measurements of the holotype. Ventral shield $494\ \mu$ ($441\ \mu$) in length, $403\ \mu$ ($380\ \mu$) in width; coxal area extending slightly anterior to the body proper; coxae not forming a capitular bay, but there is a camerostome dorsal to the first coxae; lateral edges of the coxae subparallel (Fig. 5); genital field $59\ \mu$ ($54\ \mu$) in length; three pairs of genital acetabula lying in the gonopore; first and second pairs of acetabula elongated, third pair more or less rounded and lying at extreme posterior end of genital field; numerous setae flanking



EXPLANATION OF PLATE I

Chappuisides eremitus n. sp. Female. Fig. 1, ventral view; Fig. 2, dorsal view.

Uchidastygacarus imamurai n. sp. Male. Fig. 3, palp, male; Fig. 4, P-IV and P-V, male; Fig. 5, ventral view, male; Fig. 6, dorsal shield, male.

the gonopore; excretory pore lying on the ventral shield; dorsal shield $494\ \mu$ ($438\ \mu$) in length, $395\ \mu$ ($364\ \mu$) in width; dorsal shield somewhat truncate at anterior end and bearing four pairs of glandularia (Fig. 6).

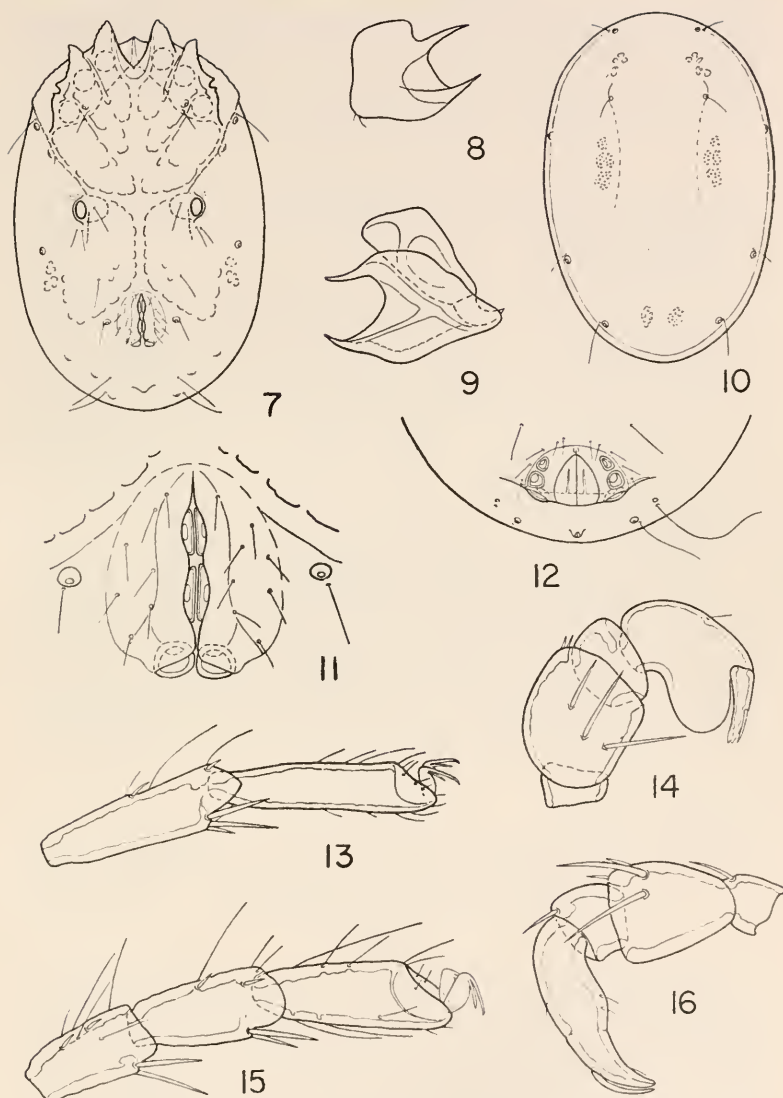
Palp highly modified; P-II and P-IV flattened; palp attached dorsally to the capitulum; measurements difficult because certain palpal segments are foreshortened regardless of orientation of palp on slide; P-I and P-III very small; P-II, $69\ \mu$ ($66\ \mu$) in length; P-IV, $87\ \mu$ ($83\ \mu$) in length; P-V, $62\ \mu$ ($64\ \mu$) in length; P-II with three long setae at distal end, two of these pectinate on one side (Fig. 3); P-IV more or less triangular, with a short, heavy, bifid seta near distal end (Fig. 4); all legs shorter than body; dorsal lengths of the distal segments of the first leg: I-Leg-4, $46\ \mu$ ($40\ \mu$); I-Leg-5, $62\ \mu$ ($55\ \mu$); I-Leg-6, $86\ \mu$ ($70\ \mu$); dorsal lengths of the segments of the fourth leg: IV-Leg-1, $62\ \mu$ ($52\ \mu$); IV-Leg-2, $53\ \mu$ ($45\ \mu$); IV-Leg-3, $48\ \mu$ ($42\ \mu$); IV-Leg-4, $57\ \mu$ ($54\ \mu$); IV-Leg-5, $76\ \mu$ ($60\ \mu$); IV-Leg-6, $72\ \mu$ ($59\ \mu$); tips of IV-Leg-6 ending in a seta $57\ \mu$ ($48\ \mu$) in length; swimming hairs absent.

Female (based on a newly metamorphosed individual): Length of body $525\ \mu$, width $418\ \mu$; dorsal shield and ventral shield, except for genital field, similar to that of male; width of genital field $110\ \mu$; three pairs of genital acetabula present, these lying on a sclerotized ring which is fused with the ventral shield (Fig. 12).

Palp and legs similar to male; P-II, $76\ \mu$ in length; P-IV, $91\ \mu$ in length; P-V, $62\ \mu$ in length.

Types: Holotype, adult male, collected in a gravel bar in the Swan River approximately six miles southeast of Bigfork, Lake Co., MONTANA, August 25, 1961; Allotype, newly metamorphosed female, same data as holotype; Paratype, one male, collected in a sand and gravel bar in Ten Mile Creek approximately seven miles south of Yachats, Lane Co., Oregon, August 13, 1961.

Discussion: Five species of *Uchidastygacarus* have been previously described, all by Imamura (1956, 1959a, 1959b, 1961) from various localities in Japan. The North American species most closely resembles *U. akiyoshiensis* Imamura in its posses-



EXPLANATION OF PLATE II

Yachatsia mideopsoides n. gen. n. sp. Male. Fig. 7, ventral view; Fig. 8, lateral view of capitulum; Fig. 10, dorsal shield; Fig. 11, genital field; Fig. 15, distal segments of first leg; Fig. 16, palp.

Chappuisides eremitus n. sp. Female. Fig. 9, lateral view of capitulum; Fig. 13, I-Leg-5 and 6; Fig. 14, palp.

Uchidastygacarus imamurai n. sp. Female. Fig. 12, Posterior end of ventral shield, female.

sion of a heavy, bifid seta near distal end of P-IV. *U. imamurai* differs in having the coxal area narrower, two pectinate setae at the distal end of P-II rather than three pectinate setae, and differs in proportions of the leg segments.

REFERENCES

- IMAMURA, T. 1956. Some subterranean water-mites from Hyogo Prefecture, Japan. Publ. Prem. Congr. Intern. Speleol., Paris, 1953. 3(3): 193-214.
- 1959a. Water-mites (Hydrachnellae and Porohalacaridae) from the subterranean waters of Akiyoshi-dai Karst, Japan. Jap. Jour. Zool. 12: 251-255.
- 1959b. Water-mites (Hydrachnellae) of subterranean waters in Kanto District, Japan. Acarologia 1: 426-451.
1961. Water-mites (Hydrachnellae), mainly in subterranean waters, from the Ryu-kyu Islands. Ibid. 3: 48-59.
- MOTAS, C. 1959. Descrierea a trei Hidracarieni noi. Acad. Rep. Pop. Romine (Extras 1959): 473-498.
- SCHWOERBEL, J. 1959. Zur Kenntnis der Wassermilbenfauna des südlichen Schwarzwaldes (Hydrachnellae, Acari). 5 Beitrag: Wassermilben aus dem Grundwasser. Mitt. bad. Landesver. Naturkunde u. Naturschutz N. F. 7: 323-330.
- SZALAY, L. 1943. Die erste Wassermilbe (Hydrachnellae) aus unterirdischen Gewässern in Ungarn. Zool. Anz. 142: 45-51.
- WALTER, C. 1947. Neue Acari (Hydrachnellae, Porohalacaridae, Trombididae) aus subterranean Gewässern der Schweiz und Rumäniens. Verh. Naturf. Ges. Basel 58: 146-238.

A New Neotropical Subgenus of *Campsomeris* (Hymenoptera: Scolidae)

J. G. BETREM *

Prof. Bradley (1957) placed his *Campsomeris tenebrica* in the subgenus *Laevicampsomeris* Betrem, 1933. Some important differences exist between the specimens that I have seen that belong to this species (4 ♀ Minas Geras, Brasil 1907 ex coll. Vogt 1960, M. Amsterdam and the typical material) and the

* This paper was completed under a research grant from the National Science Foundation.

species of this subgenus that I have before me from the Papuan subregion.

	<i>Laevicampsomeris</i>	<i>C. tenebrica</i>
Carina occipitalis.	broadly interrupted above.	complete.
Temporal ridge.	indistinct, quite near to the eye.	distinct, strongly diverging above from the eye-margin.
Punctate area on the temple near the gena.	only a few punctures.	many punctures.
Anterior margin of the clypeus.	broadly medially than at the sides.	as broad medially as at the sides.
Callosity of the pronotum.	almost impunctate.	distinctly punctate.
Anterior part of the cross-furrow of the mesopleuron.	straight or slightly bent.	strongly bent.
Mesopleuron.	entirely impunctate medially.	distinctly punctate medially.
Carina lateralis.	distinct only until the spiracles.	distinct beyond the spiracles.
Area horizontalis medialis.	very short, with parallel or diverging sides.	much longer, with converging sides.
Area horizontalis lateralis.	impunctate or with a cross-band of punctures.	entirely punctate, except on the inner anterior corner.
Abdomen.	tergite 3(2) sparsely but distinctly punctate.	tergite 3(2) impunctate before the subapical row of punctures.
Spurs of tibia III.	longer.	shorter.
Vena recurrens secunda.	absent or very incomplete.	present, distinct.

These differences are so striking that *C. tenebrica* cannot be retained in the taxon *Laevicampsomeris*. The smoothness of many parts of the body, that is so typical, must be regarded as a parallel evolution; therefore this is an analogous, not a homologous character.

I propose for this anomalous South American species the new subgenus *Tenebromeris* subgen. nov., type-species *Campsomeris tenebrica* Bradley 1957.

T ENEBROMERIS subgen. nov.

Type-species *Campsomeris tenebrica* Bradley.

Description: See above.

Campsomeris (Tenebromeris) tenebrica Bradley.

1957. *Campsomeris tenebrica* Bradley, ♀, *Entom. News*, 68: 97.

1957. *Campsomeris (Laevicampsomeris) tenebrica* Bradley, *Trans. Amer. Ent. Soc.* 83: 76.

Larval Rash of the American Dagger Moth
***Acronycta americana* Harr. (Lepi-**
doptera: Phalaenidae)

DAVID L. WRAY¹

Both involuntary and voluntary larval urticaria were experienced by the writer in this case. On October 8, 1962, while on a field trip to Umstead State Park, I collected a caterpillar of the American dagger moth and lacking any other container placed it in a paper bag to take it back to the laboratory alive. I placed this bag on the car seat between myself and my colleague who was driving. During the course of the ten-mile trip back to town the caterpillar escaped from the bag and crawled up under my shirt and made contact with the skin area on the inside of my left lower and upper arm, and a large area on the left side of my body. Since the outside temperature was 85 degrees F and it was around 4 o'clock in the afternoon with a brilliant sun shining insects were still very active for this time of year. No pain of contact was noted during the trip of some 30 minutes back to town, but, just before arriving, a marked itching sensation developed on the inside area of my left arm and on the left side of my body above the waist. After 30 minutes the whole area of my arm and side began to break out in a severe rash. There were many areas of 10-15 mm in size which became swollen somewhat as if affected by a stinging

¹ Entomologist, Insect Survey, Division of Entomology, N. C. Dept. of Agriculture, Raleigh, N. C.

nettle rash. A considerable crop of smaller sized wheals or welts with elevated whitish centers showed. The surrounding skin areas turned pinkish in contrast to the normal skin color.

Within an hour an intense pruritus developed in all areas with which the caterpillar had come into contact. In the centers of these areas the skin began to form small blisters about 2-3 mm in area. These of course were broken within a few hours by impulsive scratching.



FIG. 1. Left arm showing condition of larval rash four days after exposure.

The intense pruritus continued for 4 days after exposure. The photograph ² shows the upper and lower arm 4 days after exposure with many reddish spots caused by breaking the blisters and resultant bleeding from scratching. The wheals and erythematous areas are much reduced. A kodachrome of my left side showed even a larger crop of wheals and welts and, of course, ran through the same period of healing as the arm. The first night I bathed all affected areas with household ammonia.

² Photo, courtesy Joel Arrington, N. C. Wildlife Resources Commission, Raleigh, N. C.

which helped reduce the pruritus, and afterwards bathed the areas with alcohol. The pruritus bothered me more at night because I could not control scratching as well as during the day. The urticaria did not completely heal until about fifteen days after exposure.

The day after the involuntary exposure of my left arm and side to the urticating caterpillar I tested the caterpillar on the inside of my right forearm. Grasping it with forceps I brushed the caterpillar hairs, especially the 5 long black "daggers," all over this area of my skin from the elbow to the wrist joint. Within twenty minutes a rash began to develop as described above. Wheals 10-15 mm in diameter with surrounding erythematous patches developed just as described in the involuntary case. Also, there was no particular pain until a stinging sensation was noticed as the wheals began to form. The same intensity of pruritus developed during the next 4 days and the healing took about 15 days just as it did after my involuntary exposure.

Evidently the degree of toughness of the epidermis has much to do with the extent of the reaction to the poisonous substance from the caterpillar hairs. Both my colleague and myself have picked these caterpillars up in our bare fingers for study and photography many times previously without any apparent reaction, and he picked this one from my shoulders just before we got back to the laboratory. Also it seems evident that in this case, when the caterpillar crawled around between the body and outside clothing, it no doubt caused a more severe urtication due to the pressure of the clothing. Body perspiration also may have contributed to the severity of the urticaria that was experienced.

New American Sarcophagidae (Diptera)¹

H. J. REINHARD, College Station, Texas

The new forms described below were all encountered in materials received for study and identification during the past several years.

ERUCOPHAGA, n. gen.

This genus, as based upon the type species, *E. triloris*, described below, closely approaches the general habitus of *Coma-sarcophaga*, but differs in a number of pertinent characters among others as follows: arista long plumose on basal half or more; outer verticals strong; male front wider, subparallel from antennal base to vertex and bearing one pair (sometimes two) proclinate orbital bristles; ocellars weak to vestigial; propleuron setose; three lateral scutellar bristles, no apicals; etc.

Erucophaga triloris, n. sp.

Male.—Front subequal to eye width; head pollen white to subsilvery and dense from vertex to cheek groove except on facialia which are blackish and setose about to middle; frontals in a single row extending to antennal base; parafrontal with only a few scattered black hairs on outer half which continue downward in an irregular row on parafacial (none approaching bristle-size); frontalia deep velvety brown, not quite equal to parafrontal width; antenna black, third segment tinged with red basally and scarcely one and one-half times longer than shining black second segment; proboscis short, palpus red; cheek one-third eye length; occiput gently convex, gray pollinose, with two rows of post ocular cilia and mostly black-haired below.

Thorax with dense pale cinereous pollen, marked above by three black vittae, complete at suture and middle one extending on scutellum; latter bearing a pair of reclinate discals; postnotal slope setose; postsutural dorsocentrals 4 (anterior 2 well devel-

¹ Contribution No. 4162, Department of Entomology, Texas Agricultural Experiment Station.

oped); presutural acrostichals not differentiated, prescutellar pair large: sternopleurals 3; intraalar 2 (none near suture); anterior spiracle fringed with black scales. Legs black; mid femur without ctenidia, mid tibia with 2 anterodorsal bristles; hind tibia not villous; claws and pulvilli shorter than last tarsal segment. Wing gray hyaline; costal spine absent; third vein setulose less than halfway to small cross vein; calypters opaque white.

Abdomen black, grayish pollen above interrupted by three changeable black vittae effecting a tessellated pattern when viewed in opposite angles; third segment with 1 pair of median marginals and 2 or 3 lateral marginals, anal segment with a complete margin row, no discals; first genital segment convex and largely blackish above, second segment smaller, wholly red with a vestiture of coarser black hairs; forceps red, long and slender, bowed forward from base and tapered to a narrow rounded apex; accessory process nearly as long as forceps emarginate beyond middle on outer side and widest before the rounded apex; slender elongated penis stalk yellow, curved forward from base and extending between claspers, where the penis suddenly enlarges into an articulated segment, bearing an apical pair of slender inwardly curved processes (forming a nearly complete circle as viewed from the rear), in front of which a much shorter and simple pair of hornlike appendages which are much less conspicuous in profile; on the anterior apical extremity, the penis bears a black lobe sclerotized and shiny on hind side, softer textured and beset with recurved spinose hairs at middle in front; fifth sternite with a median V-shaped excision, lobes red and thickly clothed with black hairs.

Female.—Similar to male excepting normal sexual differences; genital orifice vertical and subslitlike, margined with stout closely set bristles.

Length, 9.5–11 mm.

Holotype male and allotype female, reared at College Station, December 6 to 12, 1961 from a parasitized larva of *Agathymus neumoegeni* (complex), collected at Clifton, Greenlee County, ARIZONA, by Kilian Roever. Paratypes: 6 males and 1 female,

same data as type; 1 female, "Sycamore Cany. 7 mi. N.W. of Payson, Arizona, 19 Oct., 1961, Kilian Roever, host *Agathymus baneri*," and 1 female, "Davis Mts. 3 mi. W of McDonald Observatory, Jeff Davis Co. Texas, 14 Oct., 1961, Kilian Roever, host *Agathymus florenceae*."

***Senotainia arenicola*, n. sp.**

Similar to *S. litoralis* Allen but the abdomen is wholly red, arista thickened to tip with penultimate segment over twice longer than wide and outer genital forceps or accessory process tapering to a narrowly rounded simple tip.

Male.—Front wide, at vertex 0.38 of head width, slightly narrower at antennal base and face moderately diverging downward; parafrontal and parafacial with heavy pale grayish white pollen on pale background, cheek and occiput darker and with thinner cinereous pollen; frontal rows strongly convergent from vertex to mid front, thence nearly contiguous to antennal base; two pairs of weak orbitals situated high up on bare parafrontal; inner and outer verticals short but distinct; ocellars divaricate; antenna reddish brown, third segment scarcely twice length of second; bare black arista pale-tipped, second segment moderately elongated and slightly widened apically; parafacial broad and apparently bare; vibrissae short and approximated with tips decussate; facialia bare; cheek narrower than parafacial; proboscis subequal head height; palpus slender, yellow; eye large, extending to or slightly below vibrissal level.

Thorax pale gray pollinose, marked dorsally with four narrow poorly defined dark vittae; acrostichal 0, 1; dorsocentral 1, 3; presutural 1 (outer); scutellum with 2 lateral and 1 equally strong decussate apical pair. Wing clear, veins including costa pale yellow, third bearing one minute seta near base; calypters opaque white. Legs black, mid tibia with one anterodorsal bristle; claws and pulvilli longer than last tarsal segment.

Abdomen predominantly red, lightly dusted above with changeable pale pollen which in favorable view extends to hind margin on last three segments; median marginals and marginal laterals on segment three, a marginal row on last; hypopygium red,

largely retracted; forceps black, prongs separated apically but nearly contiguous, tapering to blunt tips; accessory process yellow, basal three-fifths or more inflated, thence sharply reduced in width and gently bowed toward apex of forceps; shiny reddish lobes of fifth sternite moderately exposed, clothed with a vestiture of fine black hairs.

Female.—Similar to male except for usual sexual differences; genitalia retracted within anal orifice, exposed part of first segment glabrous and bowed ventrad.

Length, 5.5–7 mm.

Holotype male, Sand Dunes, Medora, KANSAS, July 4, (R. C. Smith). Allotype female, "Kas. May 23."

***Euphytomima caesia*, n. sp.**

Allied to *E. nomiivora* James, but at once distinguished in having the entire upper surface of the abdomen dusted with bluish gray pollen and the anal abdominal segment wholly black in ground color.

Male.—Head pollen subsilvery; front at vertex 0.51 of head width, narrowed to 0.42 of same at lunule; frontalia densely pollinose, nearly full width of front at vertex; short frontal bristles in a single row on outer margin of frontalia stopping at antennal base; two orbitals, one proclinate and one reclinate, situated high up on parafrontal; latter sparsely black setose on inner margin; ocellar triangle with several pairs of proclinate bristly hairs; bare parafacial wider than well depressed clypeus; epistoma narrowed and moderately prominent in profile; vibrissae short and weak, distinctly above oral margin; facialia bare; antenna black, extending about to lowest third of face, second segment scarcely shorter than third; black arista micropubescent, thickened and tapered almost to middle, both basal segment short; proboscis not quite equal to head height; palpus yellow to brown, rather long and slender with tip slightly swollen; cheek largely ventral but its profile width nearly one-fifth eye length; occiput slightly convex, clothed with a sparse vestiture of short black hairs.

Thorax and scutellum black, densely gray pollinose, dorsal vittae poorly defined. Chaetotaxy: acrostichal 0, 1: dorsocentral 2, 3; intraalar 2 (anterior one vestigial) supraalar 1 (middle one strong); postalar 2; notopleural 2; presutural 1 (outer); humeral 2-3; scutellum with 2 strong lateral (usually 1 or 2 weak intermediate ones) and 1 or 2 appressed but differentiated discal pairs; propleuron bare; postnotal slope sparsely haired. Legs black knees yellowish, femora and tibiae pollinose; tarsi slender, claws and pulvilli elongated. Wing clear, tinged with yellow basally; first posterior cell open far before wing tip; cubitulus obtusely angulate, usually stumpless; third vein with two to five setulae near base; costal spine vestigial; calypters opaque white.

Abdomen wholly black, narrower and longer than thorax, pollen above on last three segments not in defined cross bands but extending thinly to hind margin on each, where the dark ground color becomes more apparent; last two segments bearing a row of marginal bristles; genitalia black second segment sometimes red; fused forceps rather short, thin in profile, clothed with whitish pubescence on basal half behind tapering to a bluntly rounded apex; fifth sternite with a median V-shaped excision, preceding ones widely exposed. Female unknown.

Length, 6.5-8 mm.

Holotype: Willcox, ARIZONA, July 28, 1955, *Wislisenia*, (Butler-Werner). Paratypes: 4 males, same data as type.

***Opsidia vittata*, n. sp.**

Close to *O. metopioides* Allen, but at once distinguished by the distinctly vittate thorax. Other differences are listed below.

Male.—Head pollen gray with a slight brassy sheen on parafrontal and posterior orbit; front at antennal base 0.30 and at vertex 0.51 of head width; two pairs of vertical and proclinate orbital bristles; frontals in a single row extending one or two bristles below antennal base; ocellars proclinodivaricate; frontalia black, divergent upwards to vertex and at midfront level fully one-third wider than parafrontal; clypeus deeply sunk; bare, subparallel facalia nearly vertical; vibrissae on oral mar-

gin, with membrane of latter inflated and extending below eye level in profile; parafacialia bearing a distinct row of infraclinate bristles on inner margin besides one or two median rows of fine black hairs; antenna black, subequal length of face, third segment about four times length of second; bare arista thickened to middle, proximal segments short; palpus yellow, slightly enlarged on apex; cheek about one-tenth eye length.

Thorax black, with gray pollen marked by three broad black dorsal vittae, which extend to apex of scutellum; chaetotaxy as in *O. gonioides*. Wing grayish hyaline, third vein setulose nearly to small cross vein. Legs black, claws and pulvilli small.

Abdomen black with gray pollen above restricted to four smallish rounded spots on first segment and a similar submedian pair on the three following ones which are wholly gray at sides except on narrow apical margin; one pair of median marginals on segments one and two, a marginal row on two following ones but incomplete on third. Female unknown.

Length, 7 mm.

Holotype: "WEST INDIES."

OPSIDIOTROPHUS, n. gen.

This genus, as based upon the type species, *O. micidus* described below, may be confused with *Opsidia goniodes* with which it agrees in the following pertinent items among others: clypeus deeply sunk, facialia subparallel and nearly vertical, arista thickened to tip; vertex wide, front narrowed forward, etc. Aside from a smaller build, it differs in having a less prominent front, facial profile hardly receding, parafacials setose but without a differentiated row of bristles; other differences are listed below.

Opsidiotrophus micidus, n. sp.

Male.—Inner orbits convergent from vertex to antennal base thence parallel to cheeks; head pollen subsilvery; frontals weak, in a single row extending one or two bristles below antennal base; two or three short proclinate orbitals and two verticals;

ocellars weak; blackish frontalia dusted with gray pollen, much wider than parafrontal; antenna black, nearly reaching oral margin, third segment slender over three times length of second; arista bare, proximal segments short; parafacial microsetose; vibrissae approximated but short and barely decussate at tips; facialia bare; proboscis moderately slender, shorter than head height; palpus reddish brown; cheek largely ventral and narrow in profile; occiput flat to concave, gray pollinose and sparsely clothed with short black hairs.

Thorax and scutellum with moderately dense cinereous pollen above without defined vittae; pleura largely shining; three weak postsutural dorsocentrals; prescutellars usually differentiated; two sternopleurals; scutellum with three good-sized equal marginals. Wing clear, third vein with one small hair near base; cubitulus obtusely angulate, bearing a distinct fold; costal spine vestigial; calypters opaque white. Legs black, mid tibia with one anterodorsal bristle; claws and pulvilli short.

Abdomen shining black, with gray pollen bands more or less defined on basal half to three-fourths or more of last three segments above; bristling nearly obsolete but marginals sometimes differentiated on last two segments; small black hypopygium retracted in repose; forceps short terminating in slender blunt-tipped prongs; accessory process hardly as long as long forceps but much wider in profile; fifth sternite lobes small and retracted.

Female.—Quite similar to male; genitalia telescopically retracted within caudoventral anal orifice.

Length, 4.5–6 mm.

Holotype male and allotype female, Borego, San Diego Co., CALIF., April 27 and 28, 1955 (R. O. Schuster & M. Wasbauer). Paratypes: California—1 male, Mammoth Lake, July 29, 1940 (E. E. Kenaga). Arizona—1 female, Theba, March 2, 1955 (G. D. Butler); 1 female, Stafford, 30 mi. south, September 24, 1956 (G. D. Butler); 1 female, Canelo, June 19, 1958 (M. S. Adachi); New Mexico—2 males, "Belen, June 15, 1936."

COLCONDAMYIA, n. gen.

This genus, as based upon the type species, *C. falcifera*, described below, can be confused with *Emblemasoma* with which it agrees in the following characters among others: prosternum transverse; parafacial weakly haired and subequal to clypeal width; vibrissae well above oral margin; cheek fully one-half eye length; hind coxae setose on posterior margin, etc. It differs in possessing three post dorsocentrals; less strongly constricted and shorter epistoma; hairlike to vestigial ocellars; and in decisively different genitalia.

Colcondamyia falcifera, n. sp.

Male.—Head cinereous pollinose on black ground color; frontals in a single row lowermost one or two bristles below antennal base; parafrontal sparsely clothed with black hairs which extend downward on outer half of parafacial to cheek groove; outer verticals not differentiated; antenna black, third segment reaching a little below mid face level and scarcely twice length of second; arista short plumose to middle or slightly beyond; slender black palpus bowed upward and moderately thickened apically; proboscis short and thick, labella fleshy; back of head gently convex, gray pollinose, with four irregular rows of post-ocular cilia and longer pale pilose hairs on lower margin.

Thorax gray pollinose marked with three broad and two narrow intermediate black vittae; preacrostichals barely differentiated from adjacent hairs; prescutellars well developed; sternopleurals 3; scutellum with 3 lateral, 1 decussate apical and 1 reclinate discal pair; postnotal slope setose; propleuron bare. Wing gray hyaline; third vein setulose about halfway to small cross vein; bicurved hind cross vein joining fourth barely one-half its length from rectangular cubitulus; costal spine minute; calypters opaque white. Legs black, femora stout, middle pair with ctenidium; mid tibia with one anterodorsal bristle, hind tibia not villous, claws and pulvilli elongated.

Abdomen black, gray pollen above interrupted by three quite constant black vittae; basal segments without median marginal

bristles, last two each with a marginal row; red terminalia smallish, second segment globose clothed with only fine black hairs; genital forceps have a large red humplike protuberance at base behind beset with erect fine black hairs, between the latter and the free part of the forceps there is a deep excision in profile, thence the slender falcate forceps are fused about to middle, separated and divergent beyond, with a characteristic vestiture of intermixed dense brown pubescence and longish black hairs behind; red accessory process inconspicuous, short but very narrow and bearing one or two setae at apex.

Female.—Quite similar to male except for the usual sexual differences; first genital segment red, retracted within triangular anal orifice and overlapped ventrally by the glabrous black transversely convex apical sternite, which in lateral view extends obliquely ventrad, is truncate behind, somewhat reddish, softer textured and setose on lateral margin.

Length, 9.5–10.5 mm.

Holotype male and allotype female, Colconda Summit, Humboldt County, NEVADA, May 20, 1960 (T. R. Haig). Paratype: 1 male same data as type and 1 male Panvant, Utah, June 20, 1952 (G. E. Bohart, E. A. Cross).

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Pacific Insects

A quarterly journal on the systematic entomology and zoogeography of the Pacific, East Asia, Australia and Antarctica.

Vols. 1-3 (over 500 pages per volume) each \$5.00
Vol. 4 (1962) (over 700 pages) \$7.00

Pacific Insects Monographs

Adjunct series appearing irregularly and not included in subscription. To be ordered separately or standing order placed.

- 1A. *The Chrysomelidae (Coleop.) of China and Korea. Part I.* By Gressitt and Kimoto. 299 pp., 75 figs. \$4.00
2. *Problems in the Zoogeography of Pacific and Antarctic Insects.* By Gressitt, with appendices by Maa, Mackerras, Nakata, and Quate. 128 pp., 40 figs. (incl. 2 color pls.). Bound, \$2.50. Paper, \$2.00

Order from: Bishop Museum, Honolulu 17, Hawaii.

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic *Anopheles*, important malarial vectors of the Americas, and *Aedes aegypti* and *Culex quinquefasciata*

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 17

A TAXONOMIC STUDY OF THE MILLIPED FAMILY SPIROBOLIDAE (DIPLOPODA: SPIROBOLIDA)

By William T. Keeton

147 pages of text, 37 tables, 2 maps, 18 plates,
table of contents and index

Spirobolid millipeds are probably the most widely known Diplopoda in the United States, being used in many college courses; yet the family has been little studied. This monograph brings together existing knowledge of the group for the first time, and adds much new information gained from critical study of series. The taxonomic history of the family is outlined. External morphology is briefly treated, with emphasis on characters utilized in classification. A summary of current knowledge of life histories is included. The family is redefined, and each genus and species is treated in detail. Particular attention is given to variation and distribution, both of which become more meaningful biologically as a result of synonymizing many species names. Possible phylogenetic relationships of the genera are discussed, and keys to all taxa are provided, with most diagnostic characters illustrated in 18 plates or summarized in 37 tables.

Price \$5.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

Insects

ER
EN.
VT.
E

ENTOMOLOGICAL NEWS

APRIL 1963

Vol. LXXIV

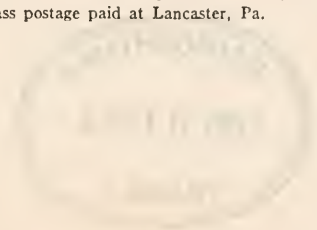
No. 4

CONTENTS

Chemsak and Linsley—New Mexican Elaphidionini	85
Chamberlin—On the chilopod genus Tomotaenia	88
Richards—Effect of temperature on wing-beat	91
Froeschner and Chapman—A South American cydnid in U. S. . .	95
Southeast Asian Insects	98
Alexander—New exotic crane-flies. Part VII	99
Scott—Collembola from Oregon. II	107

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.



ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.



Left. *Pseudaneflus auricomis* Chemsak and Linsley, ♀. $\times 3$.
Right. *Pseudaneflus puncticollis* Chemsak and Linsley, ♂. $\times 3$.

ENTOMOLOGICAL NEWS

VOL. LXXIV

APRIL, 1963

No. 4

A New Genus and Two New Species of Mexican Elaphidionini (Coleoptera: Cerambycidae)

JOHN A. CHEMSAK and E. G. LINSLEY, University of California, Berkeley

The species herein described were encountered in the course of a National Science Foundation sponsored research project on North American Cerambycidae (Grant G-19959). The material involved in the present study was made available by G. Byers, University of Kansas; E. F. Gilmour, Doncaster, England; and P. Vaurie, American Museum of Natural History.

PSEUDANEFLUS Chemsak and Linsley, new genus

Moderate-sized, subcylindrical. Integument shining; pubescence sparse to dense, depressed, erect, or recurved. Head sparsely punctate; eyes coarsely faceted, deeply emarginate; antennae eleven segmented, segments somewhat flattened, carinate, third to fifth subequal in length, third to seventh spinose at apex, spine of third segment very prominent, recurved, almost twice the length of spine of fourth segment, eleventh segment appendiculate; palpi subequal in length, apical segments expanded; genae produced into a broad spine apically. Pronotum longer than broad, widest at middle, impressed basally, not tuberculate laterally, disk finely, sparsely punctate with a median, glabrous callus; prosternal process arcuate posteriorly, broadly expanded at apex, coxal cavities closed behind, not angulate externally; intermediate coxal cavities closed to epimeron. Elytra bicostate, apices emarginate, angles spiniform. Femora slender, without apical spines; tibiae carinate.

Type species: *Pseudaneflus auricomis* Chemsak and Linsley

The affinities of this genus appear to be with the group of genera near *Aneflus*. It differs from that genus by the very long spine of the third antennal segment, the apically produced genae, the broadly expanded intercoxal process of the prosternum, and the non-rugose pronotal disk. From *Megapsyrassa* it may be distinguished by the spinose elytral apices, the closed front coxal cavities, and the punctate and/or pubescent pronotum. Two species are known to us. They may be separated as follows:

- Pubescence of elytra golden, short, appressed, dense except for subglabrous costae, long erect hairs arranged in rows along costae; pronotum minutely punctate, densely clothed with fine appressed hairs at sides. Length, 25 mm. Yucatan.....**auricomis**
- Pubescence of elytra white, not dense, recurved, without an intermixture of long erect hairs; pronotum moderately coarsely punctate, sparsely pubescent. Length 24 mm. Oaxaca.....**puncticollis**

Pseudaneflus auricomis Chemsak and Linsley, new species

Female: Form subcylindrical; color reddish-fuscos; pubescence dense, fine, appressed, golden. Head minutely punctate on vertex, densely clothed with fine, golden, appressed pubescence; antennae extending to about second abdominal segment, spine of third segment very stout, recurved, third segment longer than fourth, fifth subequal to third, eleventh longer than tenth, appendiculate, scape finely, densely punctate, clothed with fine appressed hairs, segments moderately densely clothed with very short, appressed pubescence, long erect cilia present on basal segments and at apices of outer segments. Pronotum longer than broad, sides sinuately rounded, base slightly impressed; disk with median glabrous callus, minutely densely punctate with few larger punctures near middle; pubescence dense and appressed, obscuring surface, except for median callus, few long, erect hairs interspersed; prosternum impressed, transversely rugose before coxae, pubescence in front of coxae fine, appressed, long erect hairs numerous, prosternal process broadly

expanded at apex, coxal cavities closed behind; meso- and metasternum almost impunctate, densely clothed with fine, appressed pubescence at sides; scutellum densely clothed with appressed pubescence. Elytra more than three times as long as broad; base moderately coarsely, rather finely punctate, punctures subconfluent; each elytron strongly costate basally, costae becoming obsolete toward apex; dense pubescence short, appressed, golden, except for nearly glabrous costae which contain rows of long erect hairs which are also present along suture; apices emarginate, angles spinose. Legs moderate; femora not clavate, sparsely punctate and pubescent. Abdomen sparsely punctate and pubescent; apex of fifth sternite truncate. Length, 25 mm.

Holotype female (American Museum of Natural History) from Pisté, Yucatan, MEXICO, VI-3-5-59 (P. and C. Vaurie). A female paratype from Pisté, VI-9-59 (E. C. Welling).

This species may be recognized by the dense, appressed pubescence of the head, pronotum and elytra.

***Pseudaneflus puncticollis* Chemsak and Linsley, new species**

Male: Form subcylindrical; color reddish-fuscous; pubescence sparse, white, recurved. Head with vertex almost impunctate, an impression extending transversely behind antennal tubercles, pubescence sparse; antennae about as long as body, spine of third antennal segment prominent, slightly recurved, carinae vague, segments three to five subequal in length, scape moderately coarsely, densely punctate, sparsely pubescent, segments moderately densely clothed with very short, fine, appressed pubescence, apical cilia short, eleventh segment appendiculate, longer than tenth. Pronotum longer than broad, sides subparallel except for narrowly impressed apex and broadly impressed base; disk with an elongate, median, glabrous callus and vague calluses at sides at base and apex, punctation moderately coarse, fairly dense; pubescence sparse; prosternum impressed, rugosely punctate before coxae, sparsely pubescent, intercoxal process broadly expanded at apex, coxal cavities closed behind; meso- and metasternum sparsely punctate, densely clothed with

fine appressed pubescence at sides; episternum of metathorax partially covered by elytra; scutellum densely clothed with white, appressed pubescence. Elytra more than three times as long as broad; basal punctures moderately coarse, separated; each elytron with two weak costae; pubescence sparse, white, recurved, erect hairs short, sparse; apices emarginate, bispinose. Legs moderate; femora slender, densely punctate, sparsely pubescent. Abdomen sparsely punctate, sides of sternites densely clothed with fine, appressed pubescence; apex of fifth sternite emarginate. Length, 24 mm.

Holotype male (University of Kansas) from 16 miles N. Juchitan, Oaxaca, MEXICO, V11-5-55 (R. E. Beer and party).

This species differs conspicuously from *P. auricomis* as indicated in the key.

Further Observations on the Chilopod Genus *Tomotaenia*

RALPH V. CHAMBERLIN

The brilliantly colored and relatively giant-sized geophilid now bearing the generic name *Tomotaenia* has been recorded under several different names from localities between northern Mexico on the south and British Columbia on the north. However, many years ago I had reached and announced the conclusion that only a single species is involved and that for this species the oldest applicable name is the *Strigamia parviceps* of Wood (1862), which O. F. Cook in 1895 had made the type of his genus *Tomotaenia*. Some question as to this conclusion was raised when Verhoeff in 1938 described a species from Berkeley, California, under the name *californicus* and referred it to a genus *Paraplanes* which he had proposed in 1933 for a Chinese species. In 1941 (p. 755), and again in 1954 (p. 118) I pointed out that *Paraplanes* is evidently synonymous with *Tomotaenia*.

and that *californicus* is identical with *Tomotaenia parviceps* which is common in the Berkeley area. From a study of the type specimens, R. E. Crabill (1962) found that the Mexican *Diplochora fusata* of Attems (1903) and the *Paraplancs californicus* of Verhoeff represent this same species. Thus *Diplochora* Attems became a synonym of *Tomotaenia* Cook.

A feature of *Paraplancs* given by Verhoeff is that the ultimate pretergite is fissate or separated from the pleurite on each side, a character which had not previously been noted in America for *parviceps* or any of the forms referable to *Tomotaenia*. Under the circumstances I have re-examined or examined for the first time specimens from many localities within the range of *Tomotaenia* previously mentioned. Included in this review of specimens were the following:

(a) A male syntype and many topotypes of *T. rubelliana*, described originally under *Linotaenia*, the syntype coming from the vicinity of Stanford, the topotypes from that locality and from the vicinity of Pacific Grove, the two localities given for it in the original description which did not specify a holotype.

(b) The female holotype *Tomotaenia epileptica* (Wood) and topotypes of both sexes from the Puget Sound area together with specimens from other localities in adjacent parts of Washington, British Columbia and Oregon.

In my examination of the material from the various localities I have failed to find a single specimen in which the last pretergite is non-fissate or a separation of pretergite proper from pleurite by at least a suture line is not indicated. However vague the fissure line may be shown on superficial examination, treatment of a specimen in KOH solution or a clearing reagent brings out a distinct suture. Thus all the evidence known to me leads to the conclusion that the so-called fissate structure of the last pretergite is a normal characteristic of *Tomotaenia* as represented by *T. parviceps* and its variants, and that this is apparently the only known species of giant-sized *Tomotaenia* occurring within the range of the genus in North America. The nomenclatural history involved in this commentary is given in the following summaries.

Genus **TOMOTAENIA** Cook

- Tomotaenia* Cook, 1895. Amer. Nat., vol. 29, p. 866; Chamberlin, 1941, p. 775, and 1954, p. 118; Crabill, 1962, p. 181.
Diplochora Attems, Zool. Jahrb., vol. 18, p. 281; 1929, Das Tierreich, Lief. 52, p. 229.
Paraplanes.—Verhoeff, 1933, Ark. Zool. (Stockholm), vol. 26, no. 10, p. 22.
 Generotype.—*Tomotaenia parviceps* (Wood).

Tomotaenia parviceps (Wood)

- Strigamia parviceps* Wood, 1863, Jour. Acad. Nat. Sci. Philadelphia, n.s., vol. 5, p. 49; 1865, Trans. Amer. Phil. Soc., vol. 13, p. 187.
Strigamia epileptica (Wood), 1863, Jour. Acad. Nat. Sci. Philadelphia, n.s., vol. 5, p. 49; 1865, Trans. Amer. Soc., vol. 13, p. 188, figs. 21, 22.
Tomotaenia parviceps Cook, 1895, p. 866; Chamberlin, 1941, p. 775 and 1954, p. 119.
Scolioplanes imperialis Brolemann, 1896, Ann. Ent. Soc. France, vol. 65, p. 60.
Diplochora fusata Attems, 1903, Zool. Jahrb. Syst., vol. 18, p. 281, pl. 18, figs. 24, 25; Crabill, 1962, Ent. News, vol. 73, p. 182, figs. 1-5.
Linotacnia rubellicana Chamberlin, 1904, p. 656.
Paraplanes californicus Verhoeff, 1938, Zool. Anz., vol. 122, p. 283.

REFERENCES

- ATTEMS, C. GRAF. 1903. Zool. Jahrb. (Syst.) 18: 155-302.
 —. 1929. Das Tierreich, Lief. 52: 1-388.
 BROLEMANN, H. W. 1896. Ann. Ent. Soc. France 65: 43-70.
 CHAMBERLIN, R. V. 1904. Proc. Acad. Nat. Sci. Philadelphia 56: 651-657.
 —. 1941. Ann. Ent. Soc. Amer. 34: 773-790.
 —. 1954. Ent. News 65: 117-122.
 COOK, O. F. 1895. Amer. Nat. 29: 864-866.
 CRABILL, R. E. 1962. Ent. News 73: 179-186.
 VERHOEFF, C. W. 1933. Ark. Zool. (Stockholm) 26A(10): 1-41.
 —. 1938. Zool. Anz. 122: 273-284.
 WOOD, H. C. 1863. Jour. Acad. Nat. Sci. Philadelphia 5: 1-55.
 —. 1865. Trans. Amer. Phil. Soc., n.s. 13: 137-248.

The Effect of Temperature on Wing-Beat Frequency in the Male of the Cockroach, *Periplaneta americana*¹

A. GLENN RICHARDS, Department of Entomology, Fisheries, and Wildlife, University of Minnesota

As part of a study of the effects of temperature on the rates of various activities of the American cockroach (Richards, 1958) determinations were made on the frequency of wing movement over the range 17–39° C. Only males were used since they fly considerably better than females, perhaps due to the known higher level of metabolism as evidenced by the reaction rates of the oxidative enzyme succinoxidase (Brooks, 1957).

For determinations, cockroaches tethered by a wire noose around the neck were stimulated to fly in a temperature controlled room. The temperature of the room was changed by readjustment of the controls, and readings of the wing rates were taken at times when a certified thermometer accurate to 0.02° showed the desired temperatures. Checks on actual muscle temperatures were made on a few specimens using a microthermocouple inserted in the thoracic muscles. These determinations showed that the ambient air temperature was an adequate index of body temperature when the insect was flown only at intervals for the rate determinations and only for the 15–30 seconds required to make a rate determination. Rates were determined stroboscopically using a "Strobotac" type 631B (General Radio Co., Cambridge, Mass.).

The cockroach is a relatively poor flier with slow wing movement of the flapping type. The rate of increase with temperature averages 56 cycles per minute per degree for the range 17–30°. This is a much lower rate of increase than that re-

¹ Paper No. 5026, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

Acknowledgment is due to Mr. John de Witt for assisting with the determinations. Financial assistance for this work was obtained from NSF grant no. G-1936 and NIH grant no. GM-06671. I would like to thank Dr. L. E. Chadwick for critically reading the manuscript.

corded by Chadwick (1953) for mature *Drosophila* (400 cycles/minute/degree) but in terms of percentage the increase is closely similar because the flies have a normal wing-beat frequency approximately seven times that of the American cockroach. It is interesting to note that the per cent increase per degree is very nearly the same for these two insects despite the fact that one is a slow flapping flier with each wing-beat triggered by a nerve impulse whereas the other is a fast flier with primarily myogenic stimulation of the stretched muscle sets.

Above 30° the rate of increase decreases from 56 to 38 cycles/minute/degree. Whether or not such a decrease is shown by flies is not shown by Chadwick's curves which stop at 26°; but Chadwick does show a similar change at 20° for very young flies. However, both Chadwick (1953) and Sotavalta (1947) report that there is a decrease at higher temperatures with fully mature *Drosophila* unless the humidity is held near saturation. Conceivably a water-loss factor may complicate the determinations at higher temperatures in the cockroach.

Numerical comparisons of the rates of various systems can be made by comparing the per cent increase in activity over a 10° range (called the Q_{10} of the system). Of all the Q_{10} values determined for the American rockroach, that for wing-beat frequency is the lowest. It is 1.35 in the range 17–30° and falls to about 1.15 above 30°. Q_{10} values for other systems in this species are 1.8 for running speed, 1.9 for the swimming speed of sperm, 1.3–2.5 for heart-beat frequency (depending on the temperature range used for calculating), 2.25 for total oxygen consumption, 2.25 for the oxidative enzyme succinoxidase, and 3.3 for the muscle enzyme apyrase (Richards, 1958). Why the quantitative effects of temperature changes should be so much higher with some bodily activities, and why none of them compare well with the values for muscle apyrase, is not clear. But it is clear that a change in temperature affects the rates of activity of some systems more than others.

Frequency determinations were made only down to 17° because at lower temperatures the insects did not continue flying long enough for determination by the stroboscopic method used.

By observation we found that some of our male cockroaches acclimated to 30° could just flutter their wings at 10° whereas some of those acclimated to 13° could just flutter at 7°. These values are within a degree of the chill coma temperature for this

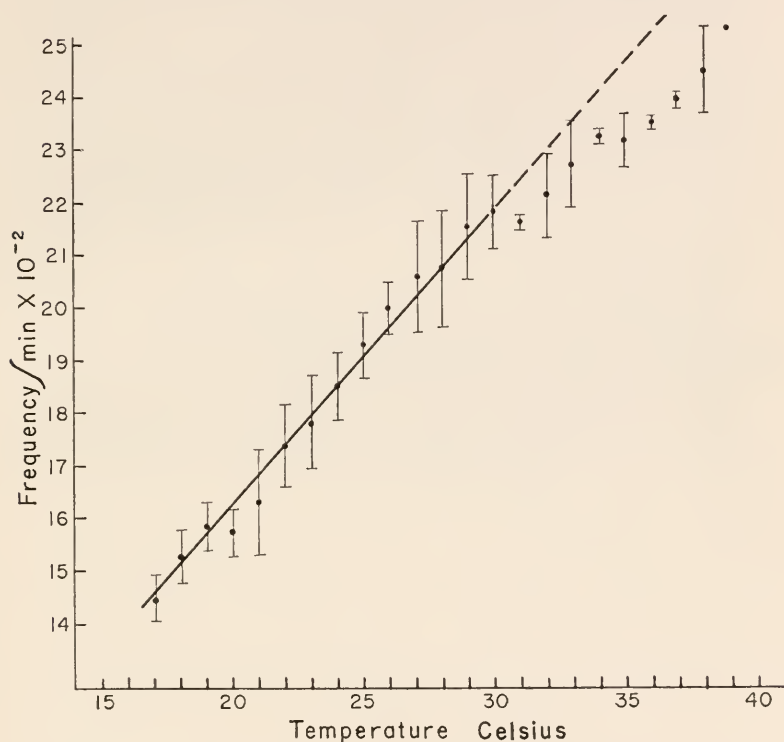


FIG. 1. Wingbeat frequency as a function of temperature in the American cockroach. The standard errors (vertical bars) are fairly high probably partly because only 9-12 determinations were made at most temperatures.

species (Mutchmor & Richards, 1961). This situation contrasts with that found in the giant water bug, *Lethocerus americanus*, where wing movements are blocked at 10° but leg movements continue feebly in the 1-2° range and feeble swimming occurs at 4° (Kenney & Richards, 1955). In *Lethocerus* the

differences in cold tolerance of leg and flight muscles are positively correlated with quantitative differences in the muscle enzyme apyrase, but such does not seem likely in the cockroach where at least the enzyme succinoxidase shows a $6.5 \times$ greater activity in wing muscles than in leg muscles (Brooks, 1957).

LITERATURE CITED

- BROOKS, M. A. 1957. Succinoxidase in the American cockroach. *Ann. Entomol. Soc. Amer.* 50: 122-125.
- CHADWICK, L. E. 1953. Factors affecting wingbeat frequency. *In* Roeder, *Insect Physiology*, pp. 591-604. John Wiley & Sons, N. Y.
- KENNEY, J. W. and A. G. RICHARDS. 1955. Differences between lag and flight muscle of the giant water bug, *Lethocerus americanus*. *Entomol. News* 66: 29-36.
- MUTCHMOR, J. A. and A. G. RICHARDS. 1961. Low temperature tolerance of insects in relation to the influence of temperature on muscle apyrase activity. *J. Ins. Physiol.* 7: 141-158.
- RICHARDS, A. G. 1958. Temperature in relation to the activity of single and multiple physiological systems in insects. *Proc. 10th Int. Congr. Entomol.* 2: 67-72.
- SOTAVALTA, O. 1947. The flight-tone (wing-stroke frequency) of insects. *Acta Entomol. Fennica* 4: 1-117.

A South American Cydnid, *Scaptocoris castaneus* Perty, Established in the United States (Hemiptera: Cydnidae)

RICHARD C. FROESCHNER¹ and QUINTON L. CHAPMAN²

The genus *Scaptocoris*, containing six species in the most recent revision (Froeschner 1960), has heretofore been known only from the American tropics where it ranges from Mexico and Cuba south to Argentina. It is, therefore, quite interesting to find that the southern-most species, *Scaptocoris castaneus* Perty, 1833, is now established in the United States.

In Charleston, S. C., about three-fourths of a mile from Charleston Harbor, adults and nymphs were found in sandy loam soil at depths of 18–24 inches. The owner of the property said that during August and September numerous adults were seen crawling on top of the ground but apparently did not feed on his lawn or shrubbery. He also commented, as have a number of entomologists who have had experience with *Scaptocoris* in nature, that the soil literally stinks from these bugs.

How did an insect whose natural range lies in Brazil and Argentina ever get to North America? The answer probably lies in the proximity of the colony to the Charleston Harbor. Early sailing ships often carried soil as ballast. When the ship was made ready to take on cargo at another port, this ballast was removed. To prevent blocking harbor facilities the soil usually was carried a short distance onto the shore and dumped. A ship coming from southern South America could very well have brought the ancestors of these insects in soil ballast. Investigations are needed to learn the age and possible spread of this population.

Any one of several features makes this one of the most easily recognized genera of hemipterons in North America (Fig. 1):
1) The falcate front tibia with the tarsus arising at its apical

¹ Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington 25, D. C.

² Plant Quarantine Division, Agric. Res. Serv., U. S. Department of Agriculture, Charleston, S. C.

third; 2) the expanding hind tibia with its obliquely truncated apex partly surrounded by a row of short, blunt pegs interspersed with heavy setae; 3) the large, transversely wrinkled scutellum with the expanded apex; or 4) the absence of hind tarsi, which is particularly noteworthy. An observant student could find several more unique features by which he could identify members of the genus.

In tropical America adults and nymphs of members of the genus are known to feed on roots of cultivated and wild plants. Several species have been reported from roots of sugarcane, cotton, bananas, tomatoes, pimentos, and other plants. However, some plants may receive certain benefits from the presence of these bugs, as noted below.

Little was known of the activities of members of this genus before Roth (1961) and Willis and Roth (1962) began publishing observations and results of experiments on another species, *Scaptocoris divergens* Froeschner. However, some of their findings undoubtedly have application to understanding the activities of other species of the genus and are summarized below:

Adults and nymphs feed on roots of plants, usually at depths of less than two feet, to which they burrow by scraping the soil with the scythelike front tibiae. The middle and hind legs push the soil shavings into the burrow behind the bug so that at all times the individual is enclosed in a small, "moving" chamber. The nymphs apparently do not remain at the same root for their entire lives but burrow from one to another. Sensory receptors on the antennae enable the insect to seek favorable moisture conditions in the soil, even though they move in a direction opposite to the effect of gravity. This response to moisture suggested a possible explanation as to why numbers of these insects are sometimes found on the surface of the ground after a rain. These excursions to the surface do not appear necessary for nuptial activities because mating pairs have been found in chambers in the soil. Soil that is too dry interferes with burrowing and may trap the insect in its subterranean chamber.

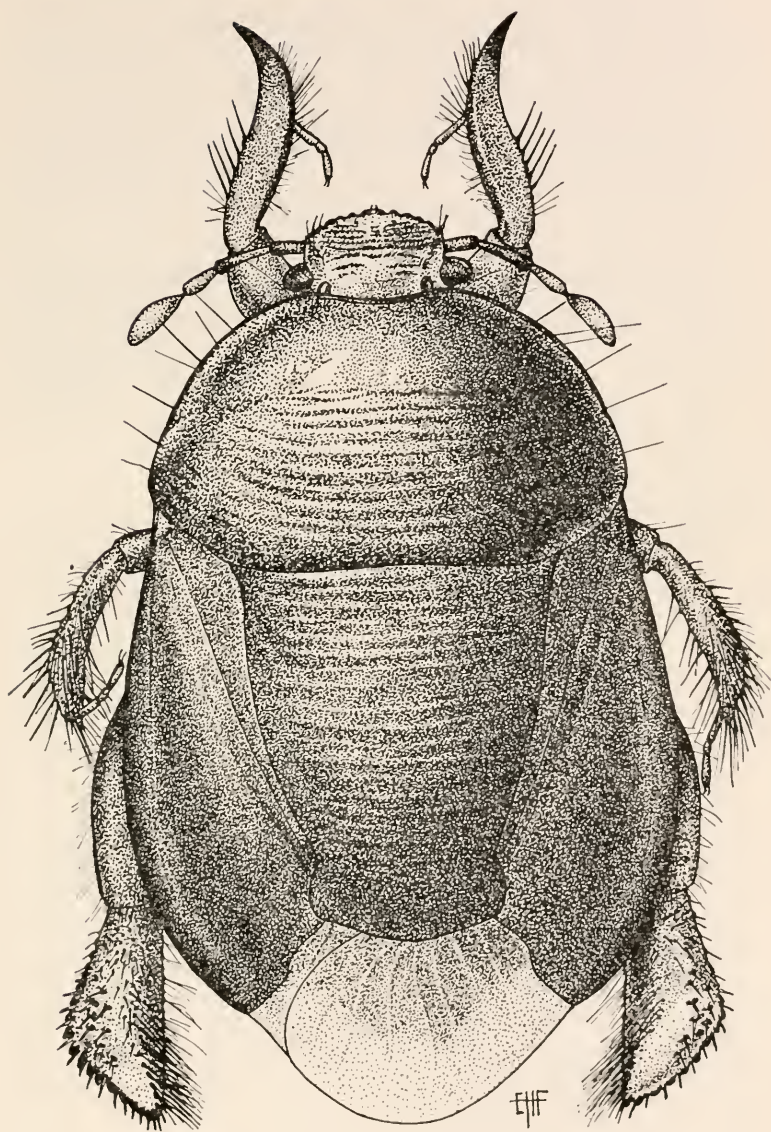


FIG. 1. *Scaptocoris castaneus* Perty.

The repugnant odor released by these bugs has interesting effects on other organisms. It is repellent to ants and inhibits development of 15 kinds of soil-inhabiting fungi, including the one that causes fusarium "wilt" of banana trees. The fungicidal action was first noted in field observations and later proved by laboratory experiments with scent fluid extracted from the bugs.

REFERENCES

- FROESCHNER, R. C. 1960. Cydnidae of the Western Hemisphere. Proc. U. S. Nat. Mus. 111: 337-680, pls. 1-13.
- ROTH, L. M. 1961. A Study of the odoriferous glands of *Scaptocoris divergens* (Hemiptera: Cydnidae). Ann. Ent. Soc. Am. 54: 900-911.
- WILLIS, E. R. and ROTH, L. M. 1962. Soil and moisture relationships of *Scaptocoris divergens* Froeschner (Hemiptera: Cydnidae). Ann. Ent. Soc. Am. 55: 21-33.

Southeast Asia Insects.

Nature and Life in Southeast Asia. Vol. II. Edited by T. Kira and T. Umesao. Pp. 290, 7" × 10", many illus. Published by Fauna and Flora Research Society, with editorial offices for this volume in the Faculty of Science, Osaka City University, Sugimoto-cho, Sumiyoshi-ku, Osaka, Japan. 1962. Bd. in heavy paper, ¥ 1,500.

Like the first volume (1961) this publishes the results of the Osaka City University Biological Expedition (OCUBE) to Southeast Asia, 1957-58. It contains several shorter papers, on Coleoptera, Diptera and Hymenoptera, a paper that lists 93 Heteroptera, with synonymy of each, one on the Hesperidae and Lycaenidae that gives a description and fine drawings of the genitalia of each of the 62 species and provides photographs of 142 whole specimens. Finally there is a 135 page paper on the Rorschach test in farming villages of North Thailand and, last, 40 photographs with legends describing village life in northern Thailand. This publication is of first class quality and is entirely in English.

New Exotic Crane-Flies (Tipulidae: Diptera). Part VII

CHARLES P. ALEXANDER, Amherst, Massachusetts ¹

The preceding part under this general title was published in ENTOMOLOGICAL NEWS, 73: 209–216, 1962. As in that article I am describing species from Assam, India, all belonging to the genus *Hexatoma*, which is greatly developed throughout south-eastern Asia. The materials were taken by Dr. Fernand Schmid to whom my sincere thanks are extended for this cooperation in making known the crane-flies of India. The types are retained in my personal collection.

Hexatoma (*Hexatoma*) *kinnara*, new species

Size small (wing of female 5.8 mm); general coloration black, more or less pruinose; antennae of female 9-segmented; halteres black; wings strongly infuscated, stigma not or scarcely differentiated; radial fork short; R_2 shorter than R_{2+3} .

♀. Length about 4.5 mm; wing 5.8 mm; antenna about 1.3 mm.

Rostrum black, moderately long, subequal to the antennal scape; palpi black. Antennae black; in female 9-segmented; flagellar segments gradually decreasing in length outwardly, the first a little shorter than the second and third combined; segments with scattered verticils. Head dull black, front and orbits more pruinose, vertical tubercle more clearly blackened, very broad and low, weakly bilobed.

Thorax uniformly black, praescutal stripes more polished black, virtually confluent; posterior sclerites weakly pruinose. Halteres black. Legs with coxae black, weakly pruinose; trochanters brownish black; remainder of legs dark brown. Wings strongly infuscated, stigma not or scarcely differentiated; linear pale streaks in centers of cells *R* and *M* and base of cell *1st A*; veins brown. Veins unusually glabrous, beyond cord with a complete series of more than 20 long trichia, with about two

¹ Contribution from the Entomological Laboratory, University of Massachusetts.

more near outer end of vein R_4 ; veins R and R_1 with abundant trichia throughout their lengths; no trichia on Sc or on veins basad of cord. Venation: Sc_1 ending immediately before fork of Rs , Sc_2 at its tip; R_2 far before fork, a little shorter than R_{3+4} , the latter about one-half R_3 ; $m-cu$ subequal to distal section of Cu_1 , about one-third its length beyond fork of M .

Abdomen black, sides of tergites paler brown; ovipositor black, all valves very blunt.

Habitat. INDIA (Assam). *Holotype:* ♀, Bongba Khunov, Manipur, 4,800 feet, July 27, 1960 (Fernand Schmid).

Hexatoma (Hexatoma) kinnara is readily told from all other regional members of the subgenus by the venation and trichiation of the wings and by the structure of the antennae. *H. (H.) khasiensis* Alexander is readily told by the coloration and pattern of the wings.

Hexatoma (Eriocera) agni, new species

Size large (wing about 20 mm); thorax and abdomen almost uniformly dull fiery orange; head brownish black, paler brown on front; antennal scape and pedicel dark brown, flagellum light yellow; legs yellow, tips of femora and tibiae narrowly black; wings strongly fulvous, cell M_1 present; abdomen deep orange, opaque, tergites six and seven dull black.

♂. Length about 18 mm; wing 20 mm; antenna about 5 mm.

♀. Length about 18–25 mm; wing 18–23 mm; antenna about 4.8–5 mm.

Rostrum yellowish brown, palpi darker brown. Antennae of male 7-segmented; scape and pedicel dark brown, flagellum uniformly light yellow; flagellar segments long-cylindrical, gradually decreasing in length outwardly; in female, antennae 11-segmented, flagellar segments gradually decreasing in length, terminal segment nearly twice the penultimate. Head behind brownish black, chestnut brown in front; orbits and a vague central line gray; posterior vertical tubercle entire, anterior tubercle low-quadrilateral.

Thoracic dorsum almost uniformly dull fiery orange, praescutum with two vaguely indicated more yellowed stripes, post-

notum more yellowed; scutellum conspicuously protuberant; setae of praescutum erect, yellow, of the scutellum more elongate. Pleura dark orange; conspicuous erect setae on dorsal anepisternum, before the wing root, sparse and scattered on the dorsal sternopleurite. Halteres short, dark brown, base of stem yellowed. Legs with coxae orange, with very long pale setae; trochanters orange; femora yellow, tips narrowly and conspicuously black, the amount subequal on all legs, on fore pair including about the outer sixth to eighth; tibiae light yellow, tip and base very narrowly darkened; basal two tarsal segments yellow, tips narrowly blackened, outer segments passing into black; claws with a conspicuous basal tooth, more obtuse in female. Wings strongly fulvous, extreme base darkened, costal border more saturated; stigma lacking; veins yellow. Costal fringe short, in male on proximal two-thirds very sparse and scattered, short but abundant in female; macrotrichia on R_{2+3} , R_3 , R_4 and R_5 , sparse on outer medial branches. Venation: Sc_1 ending opposite R_2 , Sc_2 removed; R_{2+3+4} longer than R_{2+3} , shorter than R_{1+2} ; cell M_1 subequal to or longer than its petiole; $m-cu$ opposite or just beyond midlength of M_{3+4} .

Abdomen deep orange, opaque; tergites six and seven dull black, margined with orange; sternites uniformly orange; tergites with narrow transverse silvery lines beyond base and before apex. Ovipositor with shield dark orange; cerci darkened on basal half, very long and slender.

Habitat. INDIA (Assam). *Holotype*: ♂, Huiahu, Manipur, 4,300 feet, July 1, 1960 (Fernand Schmid). *Allotopotype*: ♀, pinned with type. *Paratypes*: 2 ♀♀, Longbi Khulen, Manipur, 4,500 feet, June 30, 1960 (Fernand Schmid).

The specific name, *agni*, is from Agni, the Fire God in Hindu mythology. The most similar species is *Hexatoma (Eriocera) quadriaurantia* Alexander, of South India, which differs conspicuously in the coloration of the thorax and legs.

Hexatoma (Eriocera) homochroa, new species

Size medium (wing of female 13 mm); general coloration dull black, praescutum with four narrow more grayish stripes; sides

of intermediate abdominal segments with major silvery areas; antennae and halteres black; femora yellow, tips narrowly brownish black; wings strongly blackened, with a conspicuous white band before cord; vein R_2 oblique.

♀. Length about 10 mm; wing 13 mm; antenna about 3.2 mm.

Rostrum and palpi black. Antennae of female 10-segmented; scape and pedicel black, proximal two flagellar segments obscure yellow, remainder black; flagellar segments gradually decreasing in length, terminal segment about one-half longer than the penultimate; segments with scattered coarse setae. Head dull black; anterior vertex with two low slightly porrect tubercles, behind which is a smaller more erect elevation.

Pronotum dull black. Mesonotal praescutum dull black, with four scarcely differentiated narrow more grayish stripes, remainder of notum dull black, hind border of mediotergite slightly more pruinose; scutum, scutellum and posterior part of praescutal interspaces with delicate erect setae. Pleura dull black, the dorsopleural membrane even more intense. Halteres black. Legs with coxae and trochanters black; femora yellow, tips rather narrowly but conspicuously brownish black, on posterior pair including about the outer sixth; tibiae yellow, tips more narrowly blackened; proximal two tarsal segments brownish yellow, tips and remainder of tarsi black; claws small, with a stout basal tooth. Wings strongly blackened, cell *1st A* with a paler streak along the vein, cell *2nd A* paler along margin; a conspicuous white band before cord, extending from vein R_1 across cells R_1 , R and M , slightly entering cell Cu ; veins light brown, more yellowed in the whitened band. About two scattered trichia on veins R_3 and R_4 , with about seven on R_5 . Venation: Sc_1 ending opposite proximal end of the very oblique R_2 , the latter about three times R_{2+3} ; cell M_1 lacking; $m-cu$ beyond midlength of M_{3+4} , subequal to the distal section of Cu_1 .

Abdomen dull black, basal half of tergite two and very narrow bases of tergites three and four more nacreous; sides of tergites three and four with major silvery areas, less distinct on tergites two and five; genital tergal shield dull black, sternum fulvous. Ovipositor with valves horn-yellow, cerci with tips slightly upcurved.

Habitat. INDIA (Assam). *Holotype*: ♀, Tairenpokpi, Manipur, 4,000 feet, May 31, 1960 (Fernand Schmid).

Hexatoma (Eriocera) homochroa is generally similar to *H. (E.) nepalensis* (Westwood), differing evidently in the unicolorous ground color of the wing and the yellowed femora. *H. (E.) flavipes* (Brunetti) also is generally similar, differing evidently in the body coloration and in the venation, including the transverse R_2 and small cell $1st\ M_2$.

Hexatoma (Eriocera) mikirensis, new species

Belongs to the *verticalis* group; size relatively small (body and wing of male about 8.5 mm); antennae short, 6-segmented; entire body, including also the antennae, halteres and legs, black; wings strongly infuscated, cells *C* and *Sc* darker; veins unusually glabrous, with a series of about 15 trichia on distal section of R_5 ; R_{2+3} very short, about one-third R_2 ; cell M_1 lacking, $1st\ M_2$ long-rectangular; *m-cu* at near one-fourth M_{3+4} , about one-third longer than the distal section of Cu_1 .

♂. Length about 8.5 mm; wing 8.5 mm; antenna about 2 mm.

Rostrum and palpi black. Antennae of male 6-segmented; scape and pedicel brown, flagellum black; first flagellar segment longest, stouter at base, second segment about two-thirds the third, terminal segment nearly equal to the preceding two combined, with a weak constriction shortly before apex; all segments with strong setae, more numerous and appressed on last segment. Head dull black.

Thorax dull black; praescutum with conspicuous erect black setae. Halteres and legs black throughout; no scales on legs. Wings strongly infuscated, cells *C* and *Sc*, with the stigma, darker brown; veins dark brown. Veins unusually glabrous, with a series of about 15 trichia on distal section of R_5 ; medial veins paler and fainter than other outer veins. Venation: Sc_1 ending about opposite *r-m*, Sc_2 near its tip; R_{1+2} a little longer than R_2 ; R_{2+3} very short, about one-third R_2 ; Rs about one-half longer than R_1 ; cell M_1 lacking, $1st\ M_2$ long-rectangular; *m* transverse, about one-half the basal section of M_3 ; *m-cu* at near one-fourth M_{3+4} , one-third longer than distal section of Cu_1 .

Abdomen, including hypopygium, black, surface subnitidous.

Habitat. INDIA (Assam). *Holotype:* ♂, Bangku, Mikir Hills, United District of Mikir and North Cachar Hills, 700 feet, May 7, 1960 (Fernand Schmid).

The most similar regional species include *Hexatoma* (*Eriocera*) *fusca* (Edwards), *H. (E.) walayarensis* Alexander, and *H. (E.) yerburyi* (Edwards), all readily distinguished by the size, venation and structure of the antennae. The unusually short 6-segmented antennae of the present fly are noteworthy.

***Hexatoma* (*Eriocera*) *rudra*, new species**

Size medium (wing of male 12 mm); general coloration black, praescutum with four narrow plumbeous stripes; antennae, halteres and legs black; wings brownish yellow, base and outer costal border narrowly blackened; cell M_1 present; abdomen black, proximal two-thirds of individual tergites more plumbeous, shiny.

♂. Length about 13 mm; wing 12 mm; antenna about 2.2 mm.

Rostrum and palpi black. Antennae of male 8-segmented, black throughout; flagellar segments outwardly gradually decreasing in length and diameter; terminal segment about one-third longer than the penultimate. Head dull black, with very large porrect black setae; posterior vertical tubercle entire; anterior vertex roughened, with a low tubercle.

Pronotum black, lateral borders of scutum produced into a small tubercle. Mesothorax dull black, praescutum with four narrow more plumbeous stripes that are only vaguely differentiated; praescutum, scutum and scutellum with abundant erect to retrorse setae. Pleura with numerous setae on sternopleurite and ventral anepisternum. Halteres and legs uniformly black. Wings brownish yellow, base narrowly blackened; outer costal border narrowly blackened, the color continued distad along margin to beyond the wing tip; centers of the more basal cells paler; veins light brown. Veins chiefly glabrous; some outer radial veins with macrotrichia, including R_4 , R_5 and outer end of R_3 . Venation: Sc_1 opposite the transverse R_2 ; R_{2+3+4} and basal section of R_5 subequal, about one-half R_{1+2} ; cell M_1

shorter than its petiole; *m-cu* before midlength of M_{3+4} ; distal section of Cu_1 in virtual alignment with basal section.

Abdomen black, the proximal two-thirds of the individual tergites more plumbeous, shiny; posterior borders and outer segments, including the hypopygium, intensely black; eighth sternite projecting as a broad scoop, margin very obtuse, surface with sparse setae, virtually lacking at and near margin.

Habitat. INDIA (Assam). *Holotype:* ♂, Huiahu, Manipur, 4,300 feet, July 1, 1960 (Fernand Schmid).

Hexatoma (Eriocera) rudra is most similar to *H. (E.) atrodorsalis* (Alexander) and *H. (E.) artifex* Alexander, both of South India, differing evidently in the coloration of the body and wings and in the number of antennal segments.

Hexatoma (Eriocera) triflava, new species

Allied to *furtiva*; size large (wing of male about 16 mm); mesonotal praescutum gray with four shiny plumbeous black stripes that are narrowly bordered by dull black; antennae, halteres and legs black; wings strongly blackened, prearcular field and costal border more intensely so; outer radial and medial veins with macrotrichia, more numerous in female; abdomen black, segments two to four orange yellow, the tergites with blackened borders.

♂. Length about 17 mm; wing 16 mm; antenna about 3.5 mm.

♀. Length about 23 mm; wing 17 mm; antenna about 3.8 mm.

Rostrum brownish gray; palpi black. Antennae of male 7-segmented, of female 11-segmented; in male terminal segment with a weak constriction but not forming a separate segment; black, scape slightly pruinose; flagellar segments gradually decreasing in length outwardly, with conspicuous setae, smallest on outer segments. Head dark gray; vertical tubercle simple, conical, porrect.

Pronotum dark gray. Mesonotal praescutum with the ground gray, with four shiny plumbeous black stripes that are narrowly bordered by dull black; posterior sclerites of notum black, chiefly polished, posterior borders slightly pruinose. Pleura dull brownish black, surface pruinose. Halteres and legs black, coxae

sparsely pruinose. Wings blackened, the prearcular field, with cells *C* and *Sc*, more strongly so, stigma not differentiated; veins brown. Macrotrichia on veins R_3 , R_4 , R_5 , M_1 and M_2 very sparse and scattered in male, very numerous in female, where vein M_3 also is included. Venation: Sc_1 ending opposite R_2 , Sc_2 slightly removed; Rs about one-half longer than R ; R_{2+3} longer than R_2 ; R_{2+3+4} about three times R_{2+3} ; cell M_1 present, subequal to or shorter than its petiole; $m-cu$ at near one-third M_{3+4} ; distal section of Cu_1 curved into wing margin.

Abdomen with first segment dull black, segments two to four orange-yellow, the posterior borders of tergites narrowly blackened; remainder of abdomen, including hypopygium, black; in female, posterior borders of sternites three and four similarly blackened, genital segment orange; valves of ovipositor elongate, cerci very slender.

Habitat. INDIA (Assam). *Holotype*: ♂, Haflong, Mikir Hills, United District of Mikir and North Cachar Hills, 1,500 feet, May 5, 1960 (Fernand Schmid). *Allotype*: ♀, Bandarkhal, Cachar District, 500 feet, May 9, 1960 (Fernand Schmid).

The most similar species is *Hexatoma (Eriocera) furtiva* Alexander, of Kumaon, which likewise has three yellow abdominal segments, differing in the smaller size, details of coloration of the thorax and abdomen, and in the venation and trichiation of the wings. *H. (E). semilimpida* (Brunetti) is more distantly allied, being most readily distinguished by the extensive yellowing of the wing disk.

Collembola from Oregon. II ¹

HAROLD GEORGE SCOTT ²

The 12 species of springtail insects (except *Bourletiella repandus* q. viz.) recorded in this paper were collected by Gerald F. Kraft ³ in connection with an Oregon State University-U. S. Public Health Service grant study of the ecology of Berry Creek, Oregon (Benton Co., 9 miles north of Corvallis). All species are new records for Oregon. Most specimens will be deposited in the Oregon State University collection, but examples will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Hypogastrura armata (Nicolet, 1841).

OREGON RECORDS. Berry Creek, Jan., Apr., Jun., Dec. 1959, 1960; G. F. Kraft.

DISTRIBUTION. Alaska, Ariz., Cal., Colo., Conn., Fla., Ill., Iowa, La., Maine, Mass., Minn., Mo., N. H., N. J., N. Y., N. C., Ohio, Ore., Penna., Tex., Utah, Wash.; Ontario, Northwest Territories and Manitoba (Canada); Greenland, Mexico, South America, Europe, Africa, Australasia, Asia.

Hypogastrura californica (Bacon, 1914).

OREGON RECORDS. Berry Creek, Jan., Nov., Dec. 1960; G. F. Kraft.

DISTRIBUTION. Cal., N. M., Ore.

Hypogastrura guthriei (Folsom, 1916).

OREGON RECORD. Berry Creek, Oct. 1960, G. F. Kraft.

DISTRIBUTION. Cal., Minn., N. M., Ore., Utah; Ontario (Canada).

¹ Part I: ENT. NEWS, 73(8): 237-241.

² Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta 22, Georgia.

³ Department of Biology, Western Washington State College, Bellingham, Washington.

Genus **SPINIFACIES** nov.

TYPE SPECIES. *Spinifacies oregonensis* gen. et sp. nov.

DESCRIPTION. Family Poduridae. Subfamily Hypogastrurinae. Body elongate, segmented; scales and pseudocelli absent; Ant III sense organ with rods, no cones; postantennal organ with 3 tubercles; eyes 8 and 8 on dark eyepatches; mandible with molar surface; face with 4 dorsal spines; prothorax well developed, setaceous; unguiculus present; furcula well developed, not reaching colophore; anal spines 2.

DISCUSSION. The following combination of characters distinguishes *Spinifacies* from all other known genera of Hypogastrurinae: (1) eyes 8 and 8; (2) postantennal organ with 3 overlapping tubercles; (3) furcula and unguiculus present; (4) anal spines 2; (5) facial spines 4. For a key to genera of Nearctic Hypogastrurinae into which this genus can be readily placed, see Scott, 1962.

Spinifacies oregonensis gen. et sp. nov. Figure 1.

TYPE LOCALITY. Holotype and 6 paratypes taken from Berry Creek, 9 miles north of Corvallis, Benton County, Oregon, by G. F. Kraft, Oct. 1960. Holotype and one paratype will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania; remaining paratypes in the Oregon State University collection.

DESCRIPTION. Body elongate, segmented; blue-black dorsally with light intersegmental bands, yellowish ventrally; scales and pseudocelli absent; prominent dorsal setae as indicated in Fig. 1, lesser setae arranged over entire tergum; few ventral setae; body segments not ankylosed; tergal, pleural and sternal plates clearly delimited; head prognathous; antenna shorter than head with segments approximately as 3:3:8:8; antennal segments not subsegmented or annulate; Ant III sense organ with 2 curved rods set in a depression; postantennal organ with 3 unequal overlapping tubercles and central boss; eyes 8 and 8 on dark eyepatches; mouthparts chewing; mandible with molar plate and 4 distal teeth; maxilla with 2 distal teeth; face with 4 large

dorsal spines; prothorax well developed, setaceous; knobbed tenent hairs absent; unguis with inner tooth; unguiculus un-toothed, exceedingly slender, about $2/5$ unguis; Abd III sub-

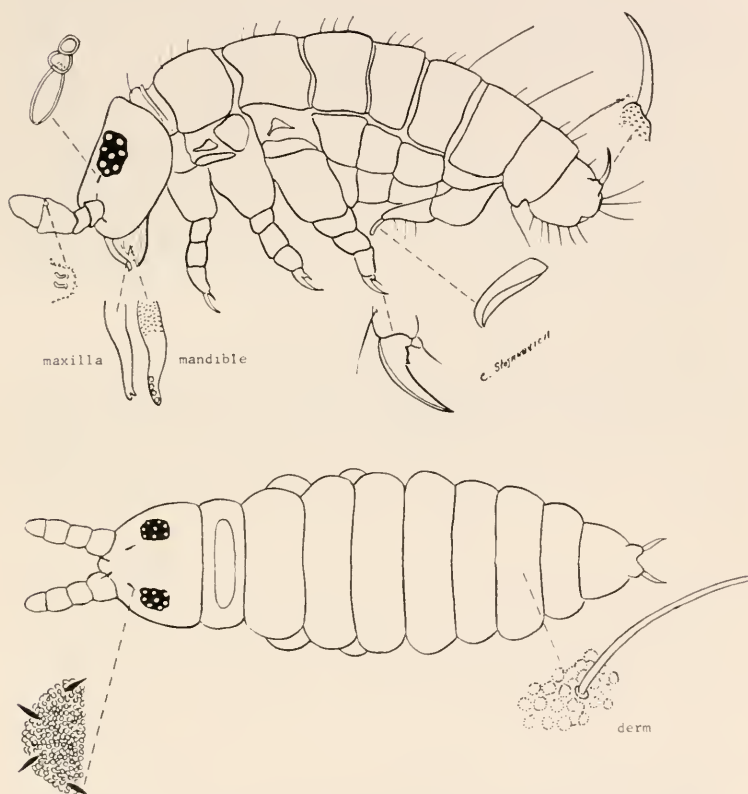


FIG. 1. *Spinifacies oregonensis* gen. et sp. nov.

equal to IV; furcula well developed, not reaching collophore; manubrium to dens to mucro approximately as 12:8:3; mucro slipper shaped, hollow; anal spines 2, longer than hind unguis, total length about 1.7 mm.

Xenylla humicola (Fabricius, 1780).

OREGON RECORDS. Berry Creek, Apr., May, Nov., Dec. 1960, G. F. Kraft.

DISTRIBUTION. Cal., Conn., Mass., N. M., N. Y., Ore., Wash.; Ontario and Manitoba (Canada), South America, Europe, Australasia.

Anurida maritima (Guerin-Meneville, 1836).

OREGON RECORD. Berry Creek, Oct. 1960; G. F. Kraft.

DISTRIBUTION. Fla., Mass., N. J., N. Y., N. C., Ore; Europe, Africa, Australasia.

NOTE. This maritime species is typically associated with ocean beaches or brackish water. It has, however, been reported associated with fresh water (Stach, 1949).

Peteronychella perpulchra Börner, 1909.

OREGON RECORD. Berry Creek, Jan. 1960; G. F. Kraft.

DISTRIBUTION. Ore.; Japan.

NOTE. This genus has not previously been recorded outside of Japan.

Isotomina thermophila (Linnaniemi, 1907).

OREGON RECORD. Berry Creek, Mar. 1960; G. F. Kraft.

DISTRIBUTION. Fla., Ill., Iowa, Ore., Tex., Utah; South America, Europe, Australasia.

Folsomia guthriei (Linnaniemi, 1912).

OREGON RECORD. Berry Creek, Oct. 1960; G. F. Kraft.

DISTRIBUTION. Minn., N. M., Ore.

Entomobrya brunneicapilla Maynard, 1951.

OREGON RECORDS. Berry Creek, Apr., May, Aug., Sep., Oct., Nov. 1960; G. F. Kraft.

DISTRIBUTION. N. M., N. Y., Ore.

Sminthurinus niger (Lubbock, 1867).

OREGON RECORD. Berry Creek, Dec. 1960; G. F. Kraft.

DISTRIBUTION. Ida., Iowa, Mass., Minn., N. Y., Ore., Tex., Northwest Territories (Canada); Greenland; South America, Europe, Africa, Australasia, Asia.

NOTE. The Oregon specimens are *S. concolor* (Meinert, 1896) now regarded as synonymous with *S. niger* (See Gisin, 1960).

Bourletiella (Deuterostminthurus) repanda (Agren, 1903).

OREGON RECORDS. Swept from alfalfa, Amity, Yamhill County, Oregon, 12 Jun. 1961, by J. Capizzi.

DISTRIBUTION. Ida., Iowa, Ore., Utah; Europe, Australasia.

SUMMARY

Twelve species of springtail insects (including *Spinifacies oregonensis* gen. et sp. nov.) are recorded for the first time from Oregon. *Pteronychella perpulchra* is recorded for the first time outside of Japan.

REFERENCES CITED

- AGREN, H. 1903. Stett. Ent. Ztg. 64: 113-176.
BACON, G. 1914. J. Ent. Zool. 6: 137-184.
BORNER, C. 1909. Sitz. Ges. Naturf. Freunde Berlin 2: 99-135.
FABRICIUS, O. 1780. Fauna groenlandica. Hafniae et Lipsiae, 211-214.
FOLSOM, J. W. 1916. Proc. U. S. Natl. Mus. 50: 477-525.
GISIN, H. 1960. Collembolenfauna Europa. Mus. Hist. Nat. Geneve, 312 pp.
GUERIN-MENEVILLE, F. 1836. IN: Iconographie de regne animal de G. Cuvier 3: 11.
LINNANIEMI, W. 1907. Allg. Teil. Acta Soc. Fennicae 34: 32-86.
———. 1912. Spezieller Teil. Helsingfors Acta Soc. Sci. Fennicae 40: 1-36.
MAYNARD, E. A. 1951. The Collembola of New York. Ithaca: Comstock Publ. Co., xxiv + 339 pp.
MEINERT, F. 1896. Medd. Naturh. Foren., 167-173.
NICOLET, H. 1841. Nouv. Mem. Soc. Helvetia Sci. Nat. 6: 1-88.
SCOTT, H. G. 1962. Ent. News 73():
STACH, J. 1949. Acta Mon. Mus. Hist. Nat., Polish Akad. Sci. Lett. (Krakow), ii + 48 pp.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Harper & Row announces:

GENERAL and APPLIED ENTOMOLOGY

Second Edition

V. A. Little

This clearly written book presents the science of entomology as a whole, with the proper balance of subject matter on morphology and physiology, taxonomy, biology, and control for a beginner's course. Enough material is included so that a course stressing either the biological phases or the economic phases of the science can be given. The insects are treated in the more logical manner by orders and families rather than by hosts (as crops); however, the pests are carefully indexed by hosts, which increases the book's value as a text in general economic entomology. The discussion of insecticides and of other phases of insect control is fuller than usual in a general text.

The second edition incorporates many important developments, especially in the field of insect control, and reports the progress in the fields of taxonomy and biology.

"This book, with its truly entomological approach, is a valuable addition to our list of applied text-books." *Entomological News*.

543 pages

\$7.50

Harper & Row, Publishers • 49 E. 33d St., N. Y. 16, N. Y.

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 17

A TAXONOMIC STUDY OF THE MILLIPED FAMILY SPIROBOLIDAE (DIPLOPODA: SPIROBOLIDA)

By William T. Keeton

147 pages of text, 37 tables, 2 maps, 18 plates,
table of contents and index

Spirobolid millipeds are probably the most widely known Diplopoda in the United States, being used in many college courses; yet the family has been little studied. This monograph brings together existing knowledge of the group for the first time, and adds much new information gained from critical study of series. The taxonomic history of the family is outlined. External morphology is briefly treated, with emphasis on characters utilized in classification. A summary of current knowledge of life histories is included. The family is redefined, and each genus and species is treated in detail. Particular attention is given to variation and distribution, both of which become more meaningful biologically as a result of synonymizing many species names. Possible phylogenetic relationships of the genera are discussed, and keys to all taxa are provided, with most diagnostic characters illustrated in 18 plates or summarized in 37 tables.

Price \$5.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

ENTOMOLOGICAL NEWS

MAY 1963

Vol. LXXIV

No. 5

CONTENTS

LaBerge and Isakson—The nest of <i>Lasioglossum</i>	113
Arnaud—Diptera from Guadalupe Island, Mexico	117
Rapp—Notes on Naucoridae	129
Eades—Charilaus and Charilainae	131
Fox—Arthur Ward Lindsey (1894–1963)	134
Waldbauer—Crepuscular <i>Volucella vesicularia</i>	135
Reviews	137

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.

AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXXIV

MAY, 1963

No. 5

The Nest of *Lasioglossum (Chloralictus) zephyrus* (Smith) in Wyoming (Hymenoptera, Halictidae)¹

WALLACE E. LABERGE and O. W. ISAKSON

A nesting site of *Lasioglossum zephyrus* (Smith) was found on the Charles Peterson ranch 12 miles east and 2 miles south of Gillette, Wyoming, on August 29, 1962, during an entomological collecting trip for the University of Nebraska State Museum. Many males were seen flying about the entrances of the nests and a sample of these was taken. Females were not observed flying on August 29th, perhaps because of the lateness of the hour, but a few females of the same species were collected nearby on flowers of *Grindelia squarrosa*. Unfortunately, rain during the night of August 29th and the day of August 30th limited investigations of the nests to a few hours during the afternoon of August 31st. The nest site and two of the nests which were excavated are described below, using the descriptive methods outlined by Sakagami and Michener (1962, p. 95).

The nest of *Lasioglossum zephyrus* (Smith)

Nest pattern Type IIIb, or O(LCh)^{nBm}, that is, main burrow without laterals, with numerous horizontal cells, ending in blind burrows, cells not markedly concentrated in one area, and main burrow branched.

¹ Published with the approval of the Director as paper No. 1312, Journal Series, Nebraska Agricultural Experiment Station, and as Contribution No. 228 of the Department of Entomology, University of Nebraska, Lincoln, Nebraska.

Nests in steep bank and cattle path at base of bank, surface without vegetative cover, bank exposed to south. Soil extremely fine, compacted sand mixed with clay. Nest area about 12 feet in length and 2 to 3 feet in width, about sixty nest entrances visible with minimum internest distance of 2 to 3 cm.

Nest entrance without visible tumulus, surrounded by a slight depression about 1 cm in diameter, constricted, 1.8 to 2.0 mm in diameter. Main burrow and branches 3.0 to 3.5 mm in diameter throughout nest. Burrows directed more or less northwesterly into bank for about 50 cm, sloping downward so that extremities were about 18 cm lower than entrance, often and irregularly bending (even turning completely about on itself), with smooth inner walls, branching irregularly and with at least five blind burrows.

Cells horizontal, scattered throughout burrows except middle section of main burrow. Uppermost cell 7 cm from entrance along burrow, but only about 4 cm below surface. First group of cells (five) filled with feces and earth. Second group of cells (seven) included 4 with dirt and feces, 2 empty, 1 with pollen ball. Remaining cells (24) were deeper (see diagram), 13 were empty, 1 dirt-filled, 5 contained young female bees (unemerged), 2 male bees (emerged), 2 pale pupae, and 1 contained a dark pupa. Cells were about 12 mm in length and 4 to 5 mm in diameter, oval with narrow end connected to burrow, inner walls smooth and seemingly consolidated with saliva. Pollen ball oval, somewhat flattened, moistened with nectar, but relatively dry or friable.

In addition to the five young females and the two males found in cells, a total of 10 females and 6 male bees were taken in various places along the burrows. Of the ten females found in the burrows, seven were of small size and seemingly were workers of the current season. None, however, were very old (the mandibles and wing tips were not worn excessively). None of the females had developed ovarioles in the ovaries. It seems that, if this is a social species, the queen bee was either missed while excavating or, more likely, had died earlier in the season. The lack of eggs and larvae in the nest supports the

latter conclusion. One of the females collected was acting as a guard at the nest entrance before it was excavated. The guard plugged the entrance with her head but when stimulated vigorously with a straw she turned about and plugged the entrance with her abdomen. Continued irritation with the straw caused the guard to descend into the burrow.

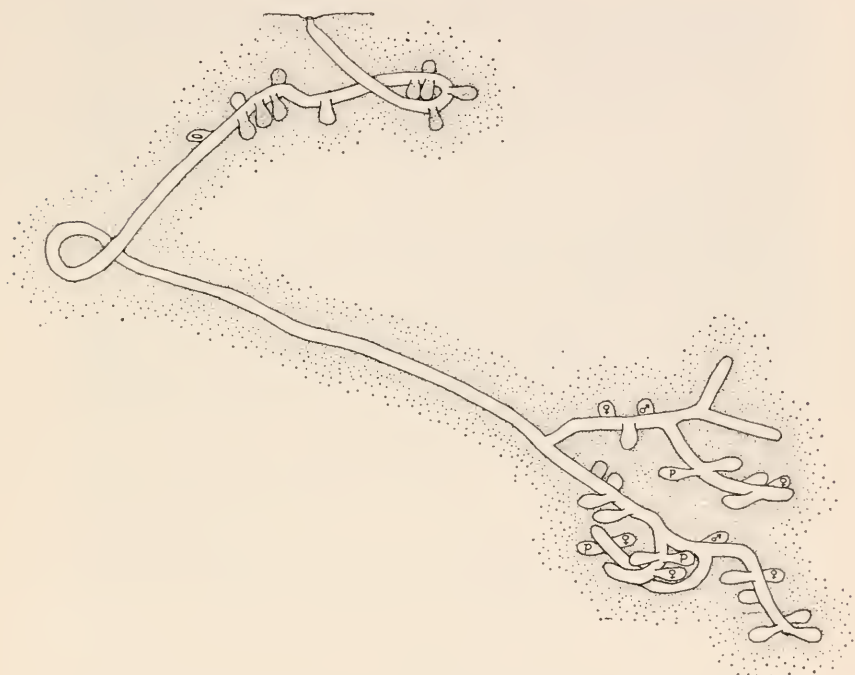


FIG. 1. Diagram of a nest of *Lasioglossum zephyrus* (Smith). The contents of the cells are indicated as follows: empty cells—empty; pollen ball—small oval; dirt and feces—stippled; female bee—♀; male bee—♂; pupa—P.

The above description is based upon only one nest. A second nest was excavated but did not yield much additional information. In the second nest the first cell was 8 cm from the entrance and about 6 cm below the surface. The main burrow turned into the bank in a northeasterly direction just before the

first cell and continued in that direction for about 20 cm at which point the burrow was unfortunately lost. In this section of the main burrow 33 cells were found. These contained the following: 29, earth; 1, pollen ball (no egg); 3, fibrous cocoons. The cocoons contained hymenopterous larvae, but these were not bees. Presumably they were parasites, perhaps Mutillidae. Only one adult bee was taken in this burrow—a young female, presumably the guard. This bee was unfertilized and had undeveloped ovarioles.

The only other published accounts of the nesting of *LasioGLOSSUM zephyrus* are of nests described by Phil Rau (1922 and 1926) in Missouri. Rau's descriptions are extremely sketchy but they agree with our observations in a number of facts. Rau found several adults occupying each nest. He assumed that each female was nidifying independently of the others. He also mentions the small size of the nest entrance which was guarded by the head of what Rau thought to be male bees but later determined probably to be female bees. Rau mentions cells and pollen balls, larvae and pupae, but gives no details regarding these. He also mentions large numbers of male bees flying about the nest site late in the season (October 2nd).

We wish to thank Dr. C. D. Michener of the University of Kansas for identifying these bees. We also appreciate the efforts of Mr. Karl V. Krombein of the U. S. National Museum and Prof. P. H. Timberlake of the Citrus Experiment Station for comparing specimens with types in their care.

LITERATURE

- RAU, PHIL. 1922. Ecological and behavior notes on Missouri insects. Trans. Acad. Sci. St. Louis 24(7): 1-71.
- . 1926. The ecology of a sheltered clay bank; A study in insect sociology. Trans. Acad. Sci. St. Louis 25: 157-276.
- SAKAGAMI, S. F. and C. D. MICHENER. 1962. The nest architecture of the sweat bees (Halictinae). The University of Kansas Press, Lawrence, Kansas, 133 pp., 1 diagram, 181 text figs.

Records of Diptera from Guadalupe Island, Mexico. Second Paper

PAUL H. ARNAUD, JR.¹

INTRODUCTION

In 1875 Baron Osten Sacken published a short article entitled "Note on some Diptera from the Island Guadalupe (Pacific Ocean), collected by Mr. E. Palmer." Twelve names (either generic or group) were mentioned, with only one, i.e., *Musca domestica* Linnaeus, determined to species. While visiting the Museum of Comparative Zoology at Harvard College in October, 1960, I discovered most of the specimens reported from Guadalupe Island by Osten Sacken pinned together as a group in a corner of a drawer of miscellaneous Diptera. The purpose of this paper is to report on this early Palmer collection and provide specific determinations whenever possible.

This is my second paper recording Guadalupe Island Diptera. The first, published in the July 1959 issue of ENTOMOLOGICAL NEWS, only recorded four species assigned to three families. The present listing of 17 species in 10 families is now the total number known from this volcanic island located off the coast of Baja California.

As will be noted by the comments under the individual species, the Diptera fauna of Guadalupe Island, as presently known, shows very little endemism. Most species are known from the mainland of western North America and are even of holarctic or of tropical distribution. The one definitely endemic species is a remarkable sarcophagid fly, described below as a new species. It is presently assigned to the genus *Blaesoxipha* with undetermined subgeneric assignment. The *Tipula* species, reported by Osten Sacken, and the *Pegomya* species, presently reported, may also be endemic. This general lack of endemism in the order Diptera is in contrast to that reported by Ridgway (1876; 183-195) who described as new eight species or sub-

¹ Research Fellow, Department of Entomology, American Museum of Natural History; Research Entomologist, Department of Entomology, California Academy of Sciences.

species of land birds, all endemic to the island. It may be further reported that of these eight species or subspecies four have now become extinct, according to Howell and Cade (1954).

It is possible that some of the Diptera in this list may also have become extinct on Guadalupe Island because of the tragic changes that have taken place since Dr. E. Palmer made his collections in 1875. The unfortunate introduction of goats, house cats, and certain rodents has greatly modified the flora and fauna since that time.

The list of Guadalupe Diptera presented below is compiled from Osten Sacken (1875), Arnaud (1959), and the present paper.

List of Guadalupe Island Diptera

Tipulidae

Tipula sp. (Osten Sacken, '75)

Bibionidae

[*Bibio* species (Osten Sacken, '75)]

Bibiodes halteralis (Coquillett) (Arnaud, '59)

Dolichopodidae

Tachytrechus angustipennis Loew (present report)

Syrphidae

Eupeodes volucris Osten Sacken (present report)

Ephydriidae

Scatella (*Scatella*) *paludum* (Meigen) (present report)

Heleomyzidae

Pseudoleria pectinata (Loew) (present report)

Trioxscelidae

Trioxscelis nuda (Coquillett) (present report)

Muscidae

Euryomma peregrinum (Meigen) (Arnaud, '59) ²

Lispe tentaculata (DeGeer) (present report)

Musca domestica vicina Macquart (present report)

Pegomya cognata Stein (Arnaud, '59)

Pegomya species (present report)

² Reported as collected in the captain's cabin of a ship anchored off Guadalupe Island.

Calliphoridae

Eucalliphora (?) *lilaea* (Walker) (present report)

Phormia regina (Meigen) (Arnaud, '59, present report)

Sarcophagidae

Blaesoxipha (*Kellymyia*) *plinthopyga* (Wiedemann) (present report)

Blaesoxipha (subgenus?) *guadalupensis*, new species

Acknowledgments

The preparation of this paper was undertaken while I was holding a year appointment as Research Fellow at the American Museum of Natural History. I would like to acknowledge my thanks to the authorities of the American Museum and to Doctors Jerome G. Rozen, Jr. and Willis J. Gertsch of the Department of Entomology for facilities and advice. I am also indebted to Doctors P. J. Darlington, Jr. and Howard E. Evans for their permission to borrow for study this historical collection from the Museum of Comparative Zoology. I would also like to thank the following specialists for their authoritative determinations and aid: H. R. Dodge, G. D. Gill, F. C. Harmston, H. C. Hockett, C. W. Sabrosky, Y. S. Sedman, and W. W. Wirth. Thanks are also extended to Miss Marjorie Statham for the line drawings and for making the photographic prints.

SYSTEMATICS

Family Tipulidae

Osten Sacken reported "1. *Tipula*, ♂, of the ordinary type of the *Tipulae lunatae*, and with peculiar brush-like appendages of the hypopygium; two females, although somewhat darker in color, probably belong to the same species. (One specimen, March 20, another, and the females, April 22)." I have not examined these specimens.

Family Bibionidae

Osten Sacken reported a "2. *Bibio*, ♂, small, black, with whitish pile; a single specimen (March 20)." This specimen

has not been available for study. It may possibly be *Bibioides halteralis* (Coquillett) reported by Arnaud (1959-183).

Family Dolichopodidae

***Tachytrechus angustipennis* Loew (det. F. C. Harmston)**

Tachytrechus angustipennis Loew, 1862, Ent. Ztschr. 6: 213-214.

Tachytrechus angustipennis, Greene, 1922, Proc. U. S. Natl. Mus. 60(17): 18-19.

1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken reported the specimen as "*Tachytrechus*, ♀. A single specimen (April 22), apparently belonging to this genus."

This species was reported by Greene as occurring in the District of Columbia (type locality), Texas, and California.

Family Syrphidae

Osten Sacken reported that he examined five specimens of the genus *Syrphus*. I have only seen one of these which is reported on below.

***Eupeodes volucris* Osten Sacken (det. W. W. Wirth)**

Eupeodes volucris Osten Sacken, 1877, Bull. U. S. Geol. Geogr. Surv. Terr. 3(2): 329-330.

1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken had reported this as "*Syrphus*, of the group of *S. affinis* Say, or *S. lapponicus* Zett. Five specimens of very different sizes, but apparently of the same species (April 22)."

Eupeodes volucris was described from specimens collected in "California, Nevada, Utah, Colorado, common." This is a common western North American species. In its southern distribution, it has been recorded from northern Sonora, Mexico City, and Loreto in Baja California.

Family Ephydriidae

***Scatella* (*Scatella*) *paludum* (Meigen) (det. W. W. Wirth)**

Ephydra paludum Meigen, 1830, Syst. Besch. 6: 118.

Scatella (*Scatella*) *paludum*, Sturtevant and Wheeler, 1954, Trans. Amer. Ent. Soc. 79: 181.

7 specimens, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken determined these as "*Scatella*, numerous specimens (March 20)."

An holarctic species, recorded by Sturtevant and Wheeler in North America from Alberta to Texas, west to the Pacific Coast states and south into Baja California and to Guadalajara, Mexico.

Family Heleomyzidae

Pseudoleria pectinata (Loew) (det. G. D. Gill)

Blepharoptera pectinata Loew, 1872, Ent. Ztschr. 16: 99.

1 ♂, 2 ♀♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; these are probably in part the specimens recorded by Osten Sacken as "*Anthomyia*, several specimens (March 20)."

This species was originally described from Texas. It is known on the Pacific Coast from British Columbia to southern California and eastward to the Atlantic Coast from the District of Columbia to South Carolina (Gill, *in litt.*). It has not previously been reported from Mexico.

Family Trixoscelidae

Trixoscelis nuda (Coquillett) (det. C. W. Sabrosky)

Leria nuda Coquillett, 1910, Proc. Ent. Soc. Washington 12: 130.

Trixoscelis nuda, Melander, 1952, Jour. New York Ent. Soc. 60: 43, 48.

1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken may have considered this specimen as a "*Drosophila* (?)", antennae broken (March 20)." The right third antennal segment and part of the left arista are missing.

The lectotype locality of *Trixoscelis nuda* is Claremont, California. It has been reported by Melander from southern California, Arizona, and Washington.

Family Muscidae

Lispe tentaculata (DeGeer) (det. H. C. Huckett)

Musca tentaculata DeGeer, 1776, *Memoires pour servir à l'histoire des insectes* 6: 86.

Lispe tentaculata, Snyder, 1954, *Amer. Mus. Novitates* 1675: 35-37.

1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken reported this specimen as "*Lispe*, one specimen (April 22)."

A holarctic species. Snyder reported it in North America "from Alaska and Hudson Bay to Guatemala and from California to Maryland" and with the further statement "can usually be found where there is running fresh water."

Musca domestica vicina Macquart (det. H. C. Huckett)

Musca vicina Macquart, 1850, *Diptères exotiques nouveaux ou peu connus*, 4^e Suppl., p. 226.

Musca domestica vicina, West, 1951, *The housefly, its natural history, medical importance, and control*, pp. 136-144.

1 ♂, 1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; Osten Sacken reported the specimens as "*Musca domestica*, several specimens (both dates)," referring to March 20 and April 22, 1875.

A subspecies of very wide distribution in warm areas; reported as occurring in the southern Nearctic, Neotropical, Oceanic, Mediterranean, and Ethiopian areas.

Pegomya species (det. H. C. Huckett)

1 ♂, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; perhaps part of series number 10 of Osten Sacken's list "*Anthomyia*, several specimens (March 20)"; a teneral specimen lacking antennae.

Doctor Hockett informed me in conversation that this dark legged species is definitely not *Pegomya cognata* Stein, a species that I reported from Guadalupe in 1959.

Family Calliphoridae

Eucalliphora ?lilaea (Walker) (det. C. W. Sabrosky)

Musca lilaea Walker, 1849, List of the specimens of dipterous insects in the collection of the British Museum, 2: 849.

Eucalliphora lilaea, Hall, 1948, The blowflies of North America, pp. 284-287.

1 teneral ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; perhaps part of series "*Lucilia* sp." collected according to Osten Sacken either on March 20 or April 22, 1875.

Lilaea is primarily Nearctic, with the southern limit of its distribution in the Highlands of northern Mexico; also doubtfully recorded from Oahu, Hawaiian Islands by Hall.

Phormia regina (Meigen) (det. C. W. Sabrosky)

Musca regina Meigen, 1826, Syst. Besch. 5: 58.

Phormia regina, Hall, 1948, The blowflies of North America, pp. 161-168.

1 ♂, 4 ♀♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; apparently part of series "*Lucilia* sp." collected according to Osten Sacken on March 20 and April 22, 1875.

An holarctic species, extending in North America south to Mexico City. It was well represented in the collection reported by Arnaud (1959-184).

Family Sarcophagidae

Blaesoxipha (Kellymyia) plinthopyga (Wiedemann) (det. C. W. Sabrosky)

Sarcophaga plinthopyga Wiedemann, 1830, Aussereuropäische zweiflügelige Insekten 2: 360.

Sarcophaga robusta Aldrich, 1916, *Sarcophaga* and allies in North America, pp. 268-270.

Hystericocnema plinthopyga, Roback, 1954, Illinois Biol. Monog., 23(3/4): 76-77.

1 ♂, 1 ♀, labeled "Isl. of Guadalupe, Pacific Ocean (E. Palmer)"; reported by Osten Sacken as "*Sarcophaga*, two specimens (March 20)."

A widely distributed American species. Roback records *plinthopyga* from "southern and western United States, Central and South America, Galapagos, and Hawaii." Aldrich reported it from the Baja California localities of San Jose del Cabo and Coronado Islands. It has been bred from decaying meat and "from carcasses of animals and exposed beef."

Blaesoxipha (subgenus ?) **guadalupensis**, new species. Figures 1-7

A medium sized species 11.5 mm in length, wing length 8.5 mm; shining black and silvery pollinose; hind tibiae villous; postabdomen black and forceps on apical halves with stubby spines; penis with stalk divided apically, with each division bifurcate.

Male (Holotype): Body length 11.5 mm.

Head (Figs. 1, 2) with front at vertex 0.23 of head width, at narrowest 0.184 of head width; black bristled and haired except for occipital hairs; black, silvery pollinose; frontalia parallel sided except for broadening at sides of ocellus, about three times width of one parafrontal at the latter's narrowest; parafrontal silvery pollinose, with fine black hairs mostly on outer side of frontals; outer verticals absent; inner verticals developed, reclinate; occipital fringe black, bristles, short except for upper bristles; occiput with several rows of black hairs, otherwise white haired below; ocellar bristles absent, hairs present; nine pairs of frontals, three pairs below antennal bases; preverticals present, reclinate; parafacial broad, not narrowed below, with row of hairs on eye side below, with several rows above; eyes bare; vibrissae developed, on oral margin; facialia with pair of small bristles above vibrissae, finely haired on basal half; antennae black, with apex of segment two and extreme base of third brownish, first segment short, second segment elongate, third segment broader at base than apically, over three times length of second segment; arista black, third segment with section before narrowing brownish; third aristal segment sparsely plumose, with single row of longer hairs above; arista with first



FIGS. 1-3. *Blaesoxipha guadalupensis*, new species, holotype male. 1. Dorsal view. 2. Head and thorax, left lateral view. 3. Right wing, dorsal view.

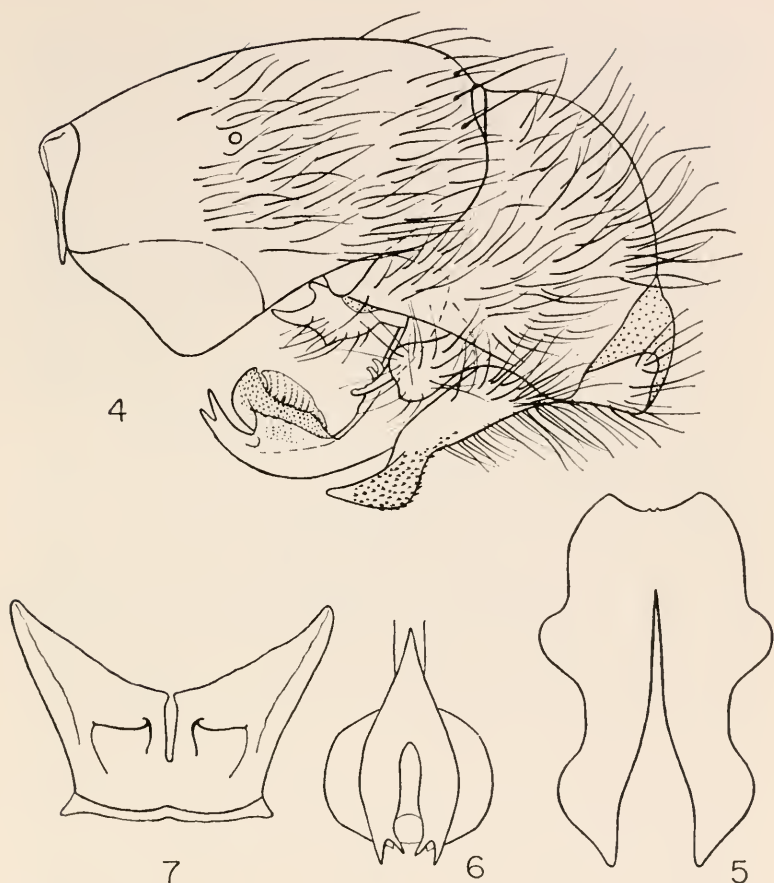
segment longer than high, second segment wider than first, about as long as high, third segment over one and one-half times length of third antennal segment, plumose on over basal half, enlarged on basal three-sevenths; cheek one-sixth head height, lightly silvery, with black bristles and thick black hairs

on lower margin; proboscis developed, haustellum shining reddish brown, black haired, labella brown, golden haired; palpus blackish, brown basally, over one and one-third times longer than third antennal segment, slightly widened apically, black bristled and haired.

Thorax black, shining, apparently non-vittate, faintly silvery pollinose, entirely black bristled and haired; three presutural dorsocentrals; three postsutural dorsocentrals; preacrostichal pair weakly developed anteriorly; postacrostichals apparently absent; one anterior preintraalar; two posterior postalars; two presupraalars; three postsupraalars; two postalars, posterior bristle stoutest; four notopleurals; three to four pairs of lateral scutellars, if four, second and third bristles small and close to fourth; apical scutellars absent; discal scutellars absent; three humerals; two stout sternopleurals; four small pteropleurals; scutellum extensively haired on posterior lateral borders; propleura bare; prosternum with median longitudinal depression, with one small black bristle and a few small hairs laterally; bare haired posteriorly.

Legs black, with reddish brown tinge; hind tibia with extensive villosity, black bristled and haired; femora very thinly silvery pollinose; mid tibia villous; hind tibia with two strong anterodorsal bristles with their bases at units 23 and 47 on tibial measurement of 92 and smaller bristles, and one strong posterior bristle with its base at unit 51; apical tarsal segments long, penultimate segments short; claws and pulvilli long, claws blackish brown, pulvilli yellow brown with white borders.

Wings elongate (Fig. 3), 8.5 mm in length, 2.9 mm in width; clear; microtrichia brownish, distinct over most of wing surface; 5R open, before wing tip; R_1 bare; R_5 bristled more than one-half distance to R_6 ; veins reddish brown; costal spine small; costal marginal setulae extending onto basal third of radiocosta; divisions of costa: costigium 20, prestigma 57, stigma 31, poststigma 81, radiocosta 21, and disticosta 6; venation as illustrated; epaulet black; squamae white, bare above, sparsely pilose at base below; halter with stalk and knob reddish black.



FIGS. 4-7. *Blaesoxipha guadalupensis*, new species, holotype male. 4. Postabdomen, left lateral view. 5. Forceps, posterior view. 6. Penis, posterior view. 7. Fifth sternite. Bristles, hairs, and stubby spines omitted from figs. 5-7.

Abdomen black, reddish tinged ventrally, shining, segments III to V with silvery pollinosity; black bristled and haired, about width of thorax; segments I + II, III, IV, and V above medially about 20(?):31:30:30 units in length; sternites broad, densely haired; sternites I to IV progressively narrowing; abdomen

shining with basal pollinosity above on segments III, IV, and V, interrupted on each side of light median pollinosity, lateral pollinosity strong; lateral pollinosity occupying less than one-third width of segments; segments I + II, III, and IV with lateral marginal bristles, without median marginals or median discs; segment V with row of marginals.

Postabdomen (Figs. 4–6) black, thickly black haired; spiracle in membrane laterally between fifth abdominal segment and first postabdominal segment; first segment elongate, 1.7 mm long, basally without hairs, with three pairs of marginal bristles; second segment above medially 1.3 mm long, extensively haired except on basal sixth above; forceps about 1.5 mm long, slightly sinuous in lateral view (Fig. 4), in posterior view (Fig. 5) with tips moderately divergent, apical halves with stubby spines; accessory plate broad at apex, haired along margin and on outer surface; anal membrane 0.52 mm long, 0.95 mm wide; penis curved anteriorly, 0.73 mm wide apically, apical segment divided, each division bifurcate, stalk medially on anterior surface also with pair of bifurcate projections; anterior claspers in profile broad and short, haired; posterior claspers long and slender, finely serrate on ventral surfaces before apexes; fifth sternite (Fig. 7) 1.42 mm wide, 0.94 mm long, with cleft over half way to base 0.27 mm in depth, with pair of prominent protuberances, each bearing bristles and hairs; apical half of sternite V bearing many stout but shortened bristles, basal portion and lateral margins of sternite without hairs or bristles.

Type Data: Holotype male, labeled Isl[and] of Guadalupe, Pacific Ocean (E. Palmer). This is No. 9 of Osten Sacken's (1875–134) list of species, which he stated was collected on March 20, 1875. The holotype is deposited in the collection of the Museum of Comparative Zoology, at Harvard College. The male postabdomen and fifth sternite are preserved in glycerine in a microvial.

Remarks: This is a very distinct species without any known close allies. There is the possibility the species may occur in Baja California, or, if not, it may have allies there that are still unknown.

LITERATURE CITED

- ARNAUD, P. H., JR. 1959. Records of Diptera from Guadalupe Island, Mexico. Ent. News 70(7): 182-185.
- HOWELL, T. R. and T. J. CADE. 1954. The birds of Guadalupe Island in 1953. The Condor 56(5): 283-294.
- OSTEN SACKEN, C. R. 1875. Note on some Diptera from the Island Guadalupe (Pacific Ocean), collected by Mr. E. Palmer. Proc. Boston Soc. Nat. Hist. 18: 133-134.
- RIDGWAY, R. 1876. Ornithology of Guadeloupe (sic!) Island, based on notes and collections made by Dr. Edward Palmer. Bull. U. S. Geol. Surv. Terr. 2: 183-195.

Notes on Naucoridae (Hemiptera)

WILLIAM F. RAPP, JR., Environmental Health Services,
Nebraska State Department of Health,
Lincoln 9, Nebraska

In the course of making stream surveys we have upon occasion collected a few specimens of naucorids. These were determined by Dr. Ira Larivers, Department of Zoology, University of Nevada, as *Ambrysus mormon* Montandon, 1909. From the rather rare literature on the Naucoridae it would appear that *A. mormon* is fairly common in California as Usinger (1956: 201) states that it is found in all the streams draining into the Sacramento and San Joaquin Valleys from the Sierra Nevada and from the Coast Ranges. It is also abundant in the north coastal streams such as the Eel River. East of the Rocky Mountains it does not appear to be common.

In our field work we have collected *A. mormon* in three locations as follows: 1) North Platte River, Torrington, Goshen County, Wyoming, Station 1, at old dam on the downstream side of highway 85 bridge. On the upstream side of this dam, debris collects and forms an excellent habitat. *A. mormon* is fairly common in this area. Specimens have been collected as follows: August 30, 1961 (J. K. Neel); October 30, 1961 (Krebs and Rapp) Station 2, one mile downstream from Station 1. In

from some driftwood along the left (north) bank, October 31, 1961 (Krebs and Rapp).

2) Little Minnie Creek, north of Johnstown, Brown County, Nebraska. One specimen in some debris along the bank. June 1, 1961 (Rapp).

3) Elkhorn River, Stuart, Holt County, Nebraska. Several specimens from debris, October 17, 1961 (Krebs and Rapp).

Usinger (1946) has given us much valuable data on the life history of *A. mormon*, but more information is needed on its ecology. All of the above specimens were in well aerated streams that were not carrying a silt load or polluted with sewage or industrial wastes. Station 2 at Torrington, Wyoming, is approximately one mile downstream from where sugar beet waste is discharged into the North Platte River. This waste is largely suspended solids, probably soil washed from beets during processing, and dissolved organic matter. At Station 2 very little mixing has taken place and the polluted water is near the right (south) bank while the water on the left (north) bank is clear and unpolluted. Thus aquatic insects can live in this reach of the North Platte River.

It would appear from our studies on Nebraska streams that naucorids are for the most part rare. However, when the proper ecological niche is located, they may be locally common. The specimens taken in the Elkhorn River at Stuart, Holt County, represent what is probably the eastern extremity for the range of *A. mormon* in North America. However, additional field work especially in the smaller unpolluted streams should add additional distributional records for naucorids.

REFERENCES

- USINGER, R. L., 1946. Kansas Sci. Bull. 31: 185-210.
—, 1956. Aquatic Insects of California. Univ. Calif. Press, Berkeley.
508 pp.

Observations on *Charilaus* and *Charilainae* (Orthoptera, Pamphagidae)

DAVID C. EADES

Examination of specimens of *Charilaus carinatus* Stål (Metsimaklaba, Bechuanaland Protectorate) has shown that certain phallic structures have been misinterpreted in published descriptions. The most serious errors are those pertaining to the cingulum. Dirsh (1956: 241) described the cingulum as "consisting of a pair of robust, strongly sclerotised apodemes, not connected in zygoma region, but curving downwards and joining ventral part of arch of cingulum; they are connected posteriorly by transverse bar (in the genus *Charilaus* only). Zygoma absent, but in its place, on internal side of apodemes, a pair of small but robust sclerites connected with apodemes, but not with each other. Rami are completely absent. Arch of cingulum connected proximally with both branches of apodemes and forming distally two pairs of complicated cingular valves, which represent the functional apex of the aedeagus." Actually, the zygoma is present and was figured by Dirsh (1956: Pl. 15, C, "Scl"). The zygoma is continuous with other parts of the cingulum; the lines in Dirsh's figure that seem to separate it from the rest of the cingulum are merely the edges of ridges on the ventral surface of the apodemes and rami. The "small robust sclerites" (Dirsh, 1956: Pl. 15, C and E, "Ascl") "in the position of the zygoma" are the suprami. The normal position of the zygoma is along the anterior edge of the mid-dorsal region of the infold that produces the cingulum. In the case of *Charilaus*, the apodemes are greatly reduced, and the zygoma is found near the anterior end of the cingulum. The rami are not absent; they are the largest parts of the cingulum. As explained by Eades (1961a) the arch in the Acrididae (*s. str.*) is not part of the cingulum, but the "arch of cingulum" in the Charilainae is part of the cingulum and is not homologous with the true arch.

In *Charilaus* there are three pairs of lobes that Dirsh (1956) called "valves of cingulum." (All three pairs are shown in

Plate 15, figures B, D, and H; but the medial pair was omitted in figures E, F, and I.) The best way to determine homologies of valves is by sclerites that extend into them. The medial pair of valves contain the distal portions of the aedeagal sclerites (apical valves of penis in part of Dirsh), but they do not contain any of the cingulum. Therefore, the medial pair of valves should be called *aedeagal valves*; they are homologous with the aedeagal valves in the Pamphaginae (see Roberts, 1941) and probably with the aedeagal valves in the Ommexechinae (see Eades, 1961b). The other two pairs of valves in *Charilaus* contain distal extensions of the rami, and Dirsh's "valves of cingulum" is a suitable term for them. However, it should be noted that the valves of cingulum in *Charilaus* are not homologous with the valves of cingulum in Pyrgomorphidae (where they are associated with the supramami) or with structures in the Acrididae (*s. str.*) that have erroneously been called "valves of cingulum" (see Eades, 1961a). "Valves of cingulum" has also been used in the Proscopiidae, but the homology here is not clear.

The shape of the endophallic sacs as shown by Dirsh (1956: Pl. 15, J) is erroneous. Superposition of his figures F and J would indicate that the right and left gonopore processes are fully fused. Actually, the ejaculatory sac and the spermatophore sac are continuous between the gonopore processes. The spermatophore sac is dorsal to the ejaculatory sac, but no more so than in the Pamphaginae.

The lateral extremes of the ventro-lateral appendices of the epiphallus in the Charilainae occupy the same position on the ectophallic membrane as the oval sclerites in other groups, and there is an internal dorso-lateral surface appropriate for the attachment of the retractor of the phallus (muscle 261 of Snodgrass, 1935). Therefore, it is reasonable to conclude that the oval sclerites are fused to the epiphallus, not absent as indicated by Dirsh (1961: 356). The same is true for the Pyrgomorphidae.

The "Charilaidae" supposedly differ from the "Pamphagidae" in the following characters (compiled from Dirsh, 1953, 1954,

1956, 1957, and 1961): 1) median carina of pronotum double, 2) outer side of hind femur with regular fish-bone pattern, 3) wing-elytron stridulatory mechanism present, 4) spermatheca with apical and preapical diverticula, 5) cingulum with apodemes separated, 6) zygoma absent, 7) rami absent, 8) arch of cingulum present, 9) endophallic sclerites not articulated, 10) spermatophore sac markedly dorsal in position, and 11) epiphallus with ventro-lateral appendices. As pointed out above, characters 5, 6, 7, and 10 are erroneous. Character 2 occurs in the "Pamphagidae" (see Dirsh, 1961: 374, fig. 9, drawing 1). Characters 3 and 8 do not occur in all Charilainae. The presence of the additional diverticulum of the spermatheca (character 4) is very little different from the lateral bulges found in some "Pamphagidae." Character 9, which could be more accurately stated "endophallic sclerites only narrowly articulated," is a relatively minor difference. Character 11 is valuable, but it does not have great phylogenetic significance. The "Pamphagidae" are the only members of the Acrididae (sense of Roberts, 1941) that lack the oval sclerites. Therefore, the difference between "Charilaidae" and "Pamphagidae" is almost certainly a degenerative loss in "Pamphagidae." This leaves only the double median carina of the pronotum (character 1), which is an important character but not sufficient justification for family rank. Thus the Charilainae must be reinstated as a subfamily within the Pamphagidae.

LITERATURE CITED

- DIRSH, V. M., 1953. *Ann. Mag. Nat. Hist.* (12)6: 161-173. 1954. *Ann. Mag. Nat. Hist.* (12)7: 670-672, 2 Pl. 1956. *Trans. Roy. Ent. Soc. London* 108: 223-356. 1957. *Proc. Roy. Ent. Soc. London* 32: 95-146. 1961. *Bull. Brit. Mus. Nat. Hist. Ent.* 10: 351-419.
- EADES, D. C., 1961a. *Ent. News* 72: 141-149. 1961b. *Proc. Acad. Nat. Sci. Phila.* 113: 157-172.
- ROBERTS, H. R., 1941. *Proc. Acad. Nat. Sci. Phila.* 93: 201-246.
- SNOODGRASS, R. E., 1935. *Smith. Misc. Coll.* 94: 1-89.

Arthur Ward Lindsey

Dr. ARTHUR WARD LINDSEY died suddenly at his home in Lancaster, Ohio, on March 8th, not quite two months after his sixty-ninth birthday. A native of Council Bluffs, Iowa, he graduated from Morningside College in 1916 and earned the Ph.D. degree from the University of Iowa in 1919. Between 1919 and 1921 he was Curator of the Barnes Collection and was junior author with Dr. William Barnes of seven studies on American moths, including a monograph of the family Pterophoridae. In 1922 he was appointed Professor of Zoology at Denison University, Granville, Ohio. Although his early work with Barnes was in moths, his chief interest was in the skipper butterflies; one of his most important contributions in entomology was *HESPERIIDAE OF NORTH AMERICA*, published in 1931 with the collaboration of R. C. Williams, Jr., and E. L. Bell. In 1942 his revision of the genus *Hesperia* appeared. From this time until he retired as Head of the Department of Zoology at Denison in 1960 his attention was centered around his teaching and administrative duties, but his *PRINCIPLES OF ORGANIC EVOLUTION* (Mosby, St. Louis) was published in 1952. In 1959 his entire collection of Hesperioidea, numbering more than 6000 specimens, including 28 types, was obtained by Dr. W. J. Holland for Carnegie Museum. Following his retirement from active teaching, he was appointed Research Associate in the Section of Insects and Spiders, Carnegie Museum, and resumed research on the skipper butterflies. At the time of his death the manuscript of *HESPERIIDAE OF LIBERIA, WEST AFRICA*, written as senior collaborator with Mr. Lee D. Miller, was in its final stages of preparation.

R. M. Fox
Carnegie Museum

Crepuscular flower visits of adult *Volucella vesicularia* Curran (Diptera, Syrphidae)

G. P. WALDBAUER, Department of Entomology, University of Illinois, Urbana, Illinois

It has long been recognized in the literature that adult syrphids are on the whole sun-loving and diurnal (Williston, 1886; Metcalf, 1913), while information which indicates that some syrphids may be crepuscular or perhaps even nocturnal seems to be scarce. Weems (1953) stated that few syrphids are attracted to lights at night, but noted that he had taken *Volucella vesicularia* Curran only at lights and that other authors had recorded similar collections.

On July 25, 1961, one of my students, Larry Collum, collected eight males and six females of *V. vesicularia* at dusk from flowers five miles N.E. of Dana, Indiana. This record was of considerable interest since I had taken only six specimens of this species during two years of collecting in the Midwest. A visit to Collum's site on July 26, 1961, revealed that the flies were visiting the flowers of the buttonbush, *Cephalanthus occidentalis* L. We began to collect approximately twenty-five minutes before sunset. Few flies were seen at first, but increasing numbers came to the flowers as sunset approached. A peak was reached at approximately sunset, and the last specimen was taken from a flower approximately thirty minutes later, although a flashlight revealed an additional individual resting on a leaf fifty-five minutes after sunset. A total of 114 specimens (48 males and 66 females) was taken in approximately seventy minutes.

Evening visits to stands of *C. occidentalis* in the area of Urbana, Illinois, produced similar results although the collections were not as large. Three collections made from July 27 to August 1, 1961, yielded fifteen males and twenty-five females. Collections on July 6 and July 9, 1962, yielded thirty males and thirty-one females.

V. vesicularia is apparently largely crepuscular. I have taken a total of only six specimens during the hours of full daylight.

One of these, a female, landed on the ground in a clearing in the woods. Five females were taken in the early afternoon from the blossoms of *C. occidentalis* at the bottom of a deep, shaded ravine near Eddyville, Illinois.

Adults of *V. vesicularia* visit the flowers of *C. occidentalis* during a period of about one hour in the late evening. The first few individuals appear approximately forty minutes before sunset. The number of flies present increases very rapidly as sunset approaches, the largest number being present during a period extending from about twenty minutes before sunset to about twenty minutes after sunset. By the end of this period it is almost completely dark and almost all of the flies have left the blossoms. On each occasion this was confirmed by examining the blossoms in the beam of a flashlight. After dark the blossoms were visited by large numbers of moths. *Atteva aurea* (Fitch) and a variety of noctuids were very abundant.

Although I have observed flowers of many species both during the day and at dusk I have not found *V. vesicularia* on anything but *C. occidentalis*. The literature, however, contains records of these flies visiting other flowers. These records are summarized below with the names of the plants as given by the authors. None of the authors stated the time of day at which the collections were made. The number of specimens taken is given in parentheses if that information was recorded. Banks *et al.* (1916), District of Columbia, *Ceanothus* sp. (1); Robertson (1927), Florida, *Ceanothus microphyllus* Pol. (1); Robertson (1928), area of Carlinville, Illinois, *Brauneria purpurea*, *Cephalanthus occidentalis*, *Clematis pitcheri*, *Comandra umbellata*, *Crataegus crus-galli*, *Cryptotaenia canadensis*, *Eupatorium purpureum*, *Ptelea trifoliata*, *Rosa humilis* (frequent), *Rubus villosus* (frequent), *Smilacina racemosa* (5), *Thaspium aurum trifoliatum*, and *Viburnum pubescens*.

Bembower (1911), Needham (1903), Robertson (1891), and Robertson (1928) presented lists of the insects visiting the flowers of *Cephalanthus occidentalis* L., but only Robertson (1928) recorded *Volucella vesicularia* Curran. However, none of these authors stated that they had collected at dusk.

REFERENCES CITED

- BANKS, N. G., C. T. GREEN, W. L. McATEE, and R. C. SHANNON, 1916. District of Columbia Diptera: Syrphidae. *Proc. Biol. Soc. Wash.* 29: 173-204.
- BEMBOWER, W., 1911. Pollination notes from the Cedar Point region. *Ohio Nat.* 11: 378-383.
- METCALF, C. L., 1913. The Syrphidae of Ohio. *Bull. Ohio State Univ.* 17(31): 1-123.
- NEEDHAM, J. G., 1903. Button-bush insects. *Psyche*. 10: 22-31.
- ROBERTSON, C., 1891. Flowers and insects. VI. *Botan. Gaz.* 16: 65-71.
- , 1927. Florida flowers and insects. *Trans. St. Louis Acad. Sci.* 25: 277-324.
- , 1928. Flowers and insects. The Science Press Printing Co., Lancaster, Pa. 221 p.
- WEEMS, H. V., JR., 1953. Notes on collecting syrphid flies. *Florida Ent.* 36: 91-98.
- WILLISTON, S. W., 1886. Synopsis of North American Syrphidae. *Bull. U.S. Nat. Museum.* 31: 1-336.

Reviews

THE NEST ARCHITECTURE OF THE SWEAT BEES (Halictinae). A Comparative Study of Behavior. **Schôichi F. Sakagami** and **Charles D. Michener**. 1962. The University of Kansas Press, Lawrence. 135 pp., 181 figs., 1 diagram, 16 tables. Price, Bd. \$5.00.

This small volume will be valued most by those entomologists interested in the study of bee behavior. It will also be of special interest to those whose concern is animal behavior in general and the evolution of behavior.

The book is both a compilation of the literature on nest architecture and behavior of halictine bees and a report by both authors of previously unpublished data on the same subjects. The literature has been reviewed thoroughly and the recorded data reinterpreted in the light of additional knowledge and modern biological theory. The original information included by both authors concerning halictine behavior and nest architecture is substantial and detailed.

The authors have been able to come to several general conclusions, some of which are not unexpected, others are rather surprising. A few examples of these are as follows: 1) Social behavior has arisen independently several times among the halictine bees. This is not too surprising when one considers the size of the group and the variety of bees found in the group. 2) The nest architecture bears no real correlation with the development of the social behavior among the halictine bees. That is to say, primitive nest types are used by both solitary and social bees and highly specialized nest types are likewise used by both solitary and social bees. This is a rather unexpected finding.

Perhaps the most remarkable aspect of this book is that it was written at all. The authors have never met and are separated by the Pacific Ocean and half of the North American continent! It is true that either Professor Michener or Professor Sakagami could have published his own information independently and several worthwhile papers would have resulted, although considerable duplication may have accompanied these efforts. We believe, however, that this book is worth much more as a whole than if its parts had been published separately and collected together. This should be instructive to independent-minded specialists throughout the world.

WALLACE E. LABERGE
Department of Entomology
University of Nebraska
Lincoln, Nebraska

A LIST OF THE APHIDS OF NEW YORK. **Mortimer D. Leonard**, Washington, D. C. Proceedings of the Rochester Academy of Science Vol. 10, No. 6. Pp. 289-428, 4 plates, Feb., 1963. Paper covers. For sale by the Librarian, Rochester Academy of Science, Rush Rhees Library, University of Rochester, Rochester, N. Y. Price \$1.50.

The life histories, economic importance, method of feeding production of winged forms, productivity, role as vectors of

plant viruses, and other pertinent information are discussed as introductory material. Detailed records of the distribution of about 350 species of aphids known to occur in New York are given, and a list of over 700 food plants on which they occur.

TICKS AND DISEASE. **Don R. Arthur** (Univ. of London). Pp. xvi + 445, 95 figs. (International Series of Monographs on Pure and Applied Biology. Division: Zoology). Row, Peterson and Co. (now Harper & Row, Publishers), New York 16, N. Y. 1962. Price \$14.00.

This is the first general treatise on ticks, those arthropods that "surpass all other arthropods in the number and variety of diseases which they transmit to mammals, and rank a close second to mosquitoes in dissemination of diseases to man." The literature on ticks is hard for the average student to come by, as it is scattered through many journals in different languages. Here we have in convenient form much of the detailed information that has accumulated in the past 20 to 30 years on ticks of all groups. Two-thirds of the volume (290 pages) is devoted to the anatomy, physiology, histology, development and behavior; the final third to disease transmission and control. —R. G. S.

THE TAXONOMY AND SPECIATION OF PSEUDOPHIONUS (a subgenus of *Harpalus*: Harpalini: Carabidae known to occur in North America). **George E. Ball** and **Joseph N. Anderson**. Studies in Speciation, No. 1. General editor: Ross H. Arnett, Jr. Published under the auspices of The Institute for the Study of Natural Species at The Catholic University of America, Washington 17, D. C., 1962. Pp. xi + 94, 39 figs. Price \$3.95.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (*Blattoidea*) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and Pyrgomorphinae of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) urgently required. Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus *Ceroglossus* wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus *Curculio* (formerly *Balaninus*) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address:

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 Race Street, Philadelphia 3, Pennsylvania

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and *Aedes aegypti* and *Culex quinquefasciatus*

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

**MEMOIRS OF THE AMERICAN
ENTOMOLOGICAL SOCIETY**

Number 18

**THE GENUS BUCCULATRIX
IN
AMERICA NORTH OF MEXICO
(MICROLEPIDOPTERA)**

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

**THE AMERICAN ENTOMOLOGICAL
SOCIETY**

1900 Race Street, Philadelphia 3, Penna., U.S.A.

Insects
ENTOMOLOGICAL NEWS

JUNE 1963

Vol. LXXIV

No. 6

CONTENTS

Schmitt—Robert Evans Snodgrass (1875–1962)	141
Wallace—John Ridgeway Bowman (1910–1962)	142
Roback—Nematode parasites of Pelopiinae (Dipt.)	143
Krombein—A new <i>Chrysura</i> from Maryland (Hym.)	149
Reinhard—Correction (<i>Golcondamyia</i> , Tachinidae)	152
Hubbard—Fleas from northeastern Tanganyika	153
Sabrosky and Arnaud—New name in <i>Pseudochaeta</i> (Dipt.)	155
Muesebeck—Six new reared species of <i>Bracon</i> (Hym.)	157
Notes and News in Entomology	
R. E. Snodgrass; J. L. Gressitt; Trans. Am. Ent. Soc.	166
Review—Dethier's <i>How to know a fly</i>	167

**PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.**

**AND
1900 RACE STREET, PHILADELPHIA 3, PA.**

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

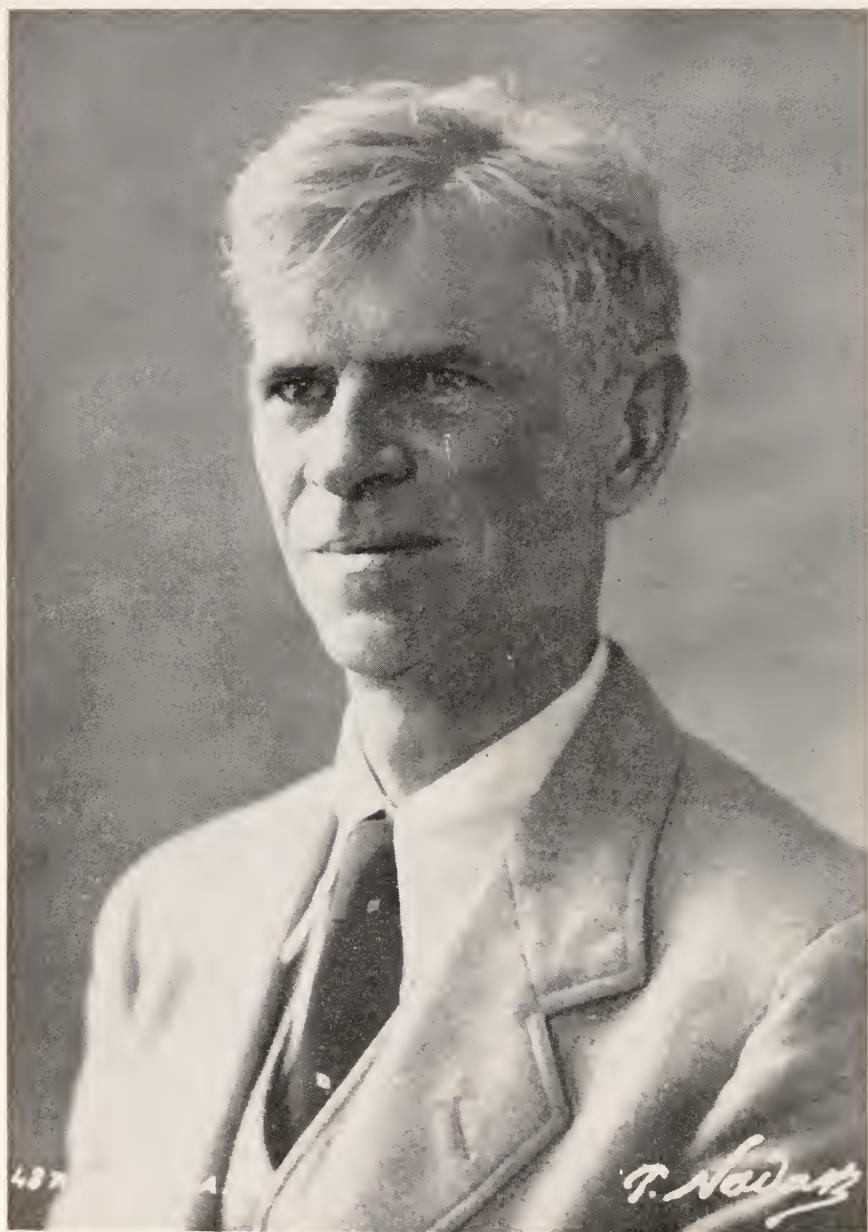
SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.



ROBERT EVANS SNODGRASS

1932

ENTOMOLOGICAL NEWS

VOL. LXXIV

JUNE, 1963

No. 6

Robert Evans Snodgrass (1875-1962)

Entomologists the world over mark with deep regret the passing of Robert Evans Snodgrass, who died during the night of September 3rd, 1962, at his home in Washington, D. C. The life thus brought to a close exercised a profound effect on the fields of arthropod morphology and physiology for more than 65 years.

R. E. Snodgrass was born in St. Louis, Mo., and was educated at Stanford University. His early interest was ornithology, but concurrent with that he began the study of insect structure to which he devoted most of his life. Coupled with his skill and insight as a professional artist which enabled him to illustrate his work with precise and elegant penwork, Snodgrass brought to this subject an amazing capacity for accurate research, logical thinking, and deep scholarship that made him the foremost morphologist of our time. Among his more than 80 publications there are four full-sized books, one of which, "Principles of Insect Morphology" (1935), is still the definitive work on the subject. After his retirement at age 70, he continued to work and publish, adding some 20 papers to his contributions. His lucid illustrations were universally borrowed. The reader is referred to Dr. Ernestine Thurman's biography of Dr. Snodgrass in volume 137 of the Smithsonian Miscellaneous Collections for a more complete account of his life and works.

Long associated with the United States Department of Agriculture, Dr. Snodgrass also taught at the University of Maryland from 1924 to 1947, and thus contributed richly to the training of many individuals. In his lifetime he received many honors, including honorary doctorates, and those rarest of

entomological distinctions, election to honorary fellowship in the Royal Entomological Society of London, and to corresponding membership in the American Entomological Society. Only a few years ago he was awarded the Leidy Medal by the Philadelphia Academy of Natural Sciences. He is survived by his wife, Ruth, two daughters, and five grandchildren.

Robert Evans Snodgrass was a modest, gracious, unassuming man possessed of a rich sense of humor which even appeared in his scientific writing. We who were privileged to know him personally will never forget him.

J. B. SCHMITT

Rutgers University
New Brunswick, N. J.

John Ridgeway Bowman (1910–1962)

Dr. John Ridgeway Bowman died in Key West, Florida December 14, 1962. He was Associate Dean and Professor of Science and Engineering at The Technological Institute, Northwestern University; Research Associate in the Section of Insects and Spiders, Carnegie Museum; and formerly (1954–1957) Head of the Department of Research, Mellon Institute for Industrial Research, Pittsburgh.

Although a research chemist by vocation, he was an enthusiastic and able entomologist, being especially interested in the broader aspects of the classification of the Coleoptera, and in the taxonomy of the coleopterous family *Pselaphidae*. His monograph "The Pselaphidae of North America" appeared in 1934.

Dr. Bowman was born at New York, N. Y., January 27, 1910. He attended the University of Pittsburgh, where he received the degrees of B.S. in 1929, and Ph.D. (math., biol.) in 1934. Dr. Bowman joined the staff of Northwestern University in 1957. In 1959–60 he was Visiting Professor at the University of Alaska where he taught advanced mathematics. For the past two years he was a consultant in chemistry at Key West. He is survived by his wife Mrs. Carolyn R. Bowman.

GEORGE WALLACE

Nematode Parasites of Pelopiinae (Diptera, Tendipedidae) *

SELWYN S. ROBACK, Curator, Department of Limnology,
Academy of Natural Sciences of Philadelphia

Although nematode parasites are common in the Tendipedidae, few have been recorded from the Pelopiinae. Rempel (1940) recorded nematodes (species of *Mermis*) from the genera *Chironomus*, *Pentapedilum*, *Tanytarsus* (= *Calopsectra*) *Thalassomyia* and *Cricotopus*. Thienemann (1954) summarized the literature on this subject and cited other genera in the Diamesinae, Orthoclaadiinae and Tendipedinae from which nematodes parasites have been recorded. He mentioned, however, that he had found none in Tanypodinae larvae and cited only one record, Zschokke (1911), of parasitism of *Tanypus* larvae by *Mermis*. Wülker (1961) records *Paramermis* from *Chironomus*, *Camptochironomus* and *Tanytarsus* (= *Calopsectra*).

The specimens recorded here were found in a large collection of small Diptera, all preserved in alcohol, sent to the author by Dr. Rupert Wenzel of the Chicago Natural History Museum. They are representative of 3–5 genera of Pelopiinae, depending on one's taxonomic bent. The figures were made from slide mounts of the specimens concerned.

Pentaneura sp., (Group C of Edwards)

This specimen was a typical intersex in the sense of Rempel (1940). The antennae were typically female, Fig. 9, while the abdomen bore fully developed external male genitalia. The abdomen contained a single worm, Fig. 13, and there were no vestiges of the internal gentalic ducts or structures present. The specimen appeared to represent a new species near *P. barberi* (Coq.) but it was not felt advisable to base a new species on an intersex holotype.

* The support of the National Science Foundation in this work is gratefully acknowledged.

Material examined

1 ♀, 3 ♂ Mi S. Cave Creek P. O., Maricopa Co., Arizona, 11-30-VI-52. Coll. Gloyd.

***Pentaneura (Ablabesmyia) illinoensis* (Mall.)**

Tanytus illinoensis Malloch Bull. Ill. Lab. Nat. Hist. 10: 376, 377, 1915

Two parasitized specimens were found in a series of 6 of this species. Of these two, one was a typically aberrant female in the sense of Rempel (1940). All the measurements of the external secondary sexual characters, antennal segments, leg ratios, etc., were identical with those of a normal female from the same series. The only differences that could be found were in the shape of the last antennal segment, Figs. 5, 6, and in the caudally prolonged genital clasper of the parasitized female, Figs. 7, 8. Since only a single parasitized female was available one cannot be sure that these differences are not artifacts of mounting.

The second specimen was unusual in that it was basically male in character. The antennae rather than being of the female type as in a typical intersex were basically of a reduced male type, Fig. 14, or intersexual antennae of Wülker (1961).

The antennal flagellum was apparently only 13-segmented. The first two segments were so closely fused that the line of separation was practically indistinguishable. In addition the usually elongate 13th segment was greatly reduced in length as were its plume hairs. The antennal ratio here was .82 while the normal antennal ratio of *P. illinoensis* is 2.33. The external genitalia and foreleg ratio of the parasitized male were normal for the species. Intersexual antennae have been recorded in the literature in the past. Thienemann (1950) figured intersexual antennae of *Eukiefferiella ruttneri* Gowin.

Wülker (1961) found intersexual antennae, under natural conditions, in males of *Tanytarsus* (= *Calopsectra*) and orthocladiines and, experimentally, in *Chironomus*. He states that male intersexes are entirely feminized as regards external sec-

ondary sexual characters while females are unchanged. This was true in the case of *P. pusillus* (Loew) but in the case of *P. illinoensis* (Mall.) the male leg ratio, as was mentioned above, was not changed.

Rempel (1940) recorded only two males of *C. attenuatus* (Walk.) [= *decorus*] with worms and both were normal in all respects. He suggested that worms can seldom complete their cycle in males. Wülker, however, states that intersexuality induced by parasitic Mermithidae concerns male and female individuals in the same degree.

Material examined

5 ♀ (one infested), Island Lake, Hiawatha Nat. Forest, Alger Co., Mich., 14 Aug 53. Coll. Dybas.

1 ♂ (infested), same data as above.

Procladius (Psilotanypus) pusillus (Loew)

Tanypus pusillus Loew Berl. Ent. Zeitschr. 10: 5, 1866

A series of five males of this species demonstrated the same phenomenon observed under *P. illinoensis* (Mall.). In each the external genitalia were normal and the antennae are typically male but reduced in the direction of the female. Figs. 1 to 4 show four degrees of reduction of the plume hairs of the 13th flagellar segment from almost normal, Fig. 1 to very reduced, Fig. 4. The reduction in length of the 13th segment corresponds to the degree of plume reduction. Table 1 gives the ratios of the antennal segments compared to those of non-parasitized males from Florida. The apex of a normal female antenna is shown for comparison in Fig. 10.

In addition to the antennal reduction the leg ratios are also reduced to about those of the female. Table 2 compares those of the parasitized males with those of a normal male from Florida and females from the same collection. The foreleg ratio of the parasitized male *P. illinoensis* did not show such a reduction.

Each of the males discussed had only one worm in its abdomen, Fig. 11. There was no variation in the measurements

of the basistyle and distyle of the four specimens or in the ratio of the interocular distance to the length of the dorsal eye extension. It is interesting to note that in this collection of 10 specimens overall, only the males were parasitized.

TABLE 1. Comparison of antennal segments of normal and parasitized males of *P. pusillus* (Loew)

	Apical	13	1-12	AR
Normal ♂	9	48	31	1.84
Normal ♂	9	46	32	1.75
P ♂-A	8	40	31	1.52
P ♂-B	9	34	29	1.48
P ♂-C	8	30	31	1.23
P ♂-D	8	28	29	1.31

TABLE 2. Comparison of leg ratios (I-III) of parasitized males of *P. pusillus* (Loew) with a normal male and female

	I	II	III
Normal ♂	.65	.58	.60
P ♂-A	.57	—	.60
P ♂-B	.57	.55	.54
P ♂-C	.55	.55	.56
P ♂-D	.58	.52	.54
Normal ♀	.56	.55	.57

EXPLANATION OF FIGURES

FIGS. 1-4, 10, 11. *Procladius* (*Psilotanypus*) *pusillus* (Loew). 1. Apex of antenna, parasitized male A. 2. Apex of antenna, parasitized male B. 3. Apex of antenna, parasitized male C. 4. Apex of antenna, parasitized male D. 10. Apex of antenna, normal female. 11. Lateral view of male abdomen with nematode.

FIGS. 5-8, 14. *Pentaneura* (*Ablabesmyia*) *illinoensis* (Malloch). 5. Apex of antenna, normal female. 6. Apex of antenna, parasitized female. 7. Genital clasper, normal female. 8. Genital clasper, parasitized female. 14. Antenna, parasitized male.

FIGS. 9, 13. *Pentaneura*, (Group C) sp. 9. Antenna, intersex. 13. Dorsal view, abdomen of intersex with nematode.

FIG. 12. *Coclotanypus scapularis* (Loew). 12. Lateral view of female abdomen with nematodes.



Material examined

5 ♂ (all infested), Brooksville, Hernando Co., Florida, 20-VI-55
at light. Coll. Dybas.

5 ♀ (non infested), same locality.

Procladius (Procladius) culiciformis (Linnaeus)

Tipula culiciformis Linnaeus Syst. Nat. Ed. 12: 978, 1767

One female of this species was found with the abdomen completely filled by a mermithid worm. Except for the resultant distension of the abdomen, the specimen externally appeared to be a normal female. The antennae, legs and genital claspers were all typical for the species. Internally, the spermathecae were absent. This specimen would fit Rempel's (1940) aberrant female category.

Material examined

1 ♀, Island Lake, Hiawatha Nat. Forest, Alger Co., Mich., 14
Aug. 55. Coll. Dybas.

Coelotanypus scapularis (Loew)

Tanypus scapularis Loew, Berl. Ent. Zeitschr. 10: 2, 1866

Two females were found with the abdomen, Fig. 12, completely filled with coiled worm. The abdominal cavity was so densely packed that it was impossible to determine accurately the number of worms involved. There did, however, appear to be more than one present. Except for the loss of the spermathecae, the specimens were normal females of this species.

Material examined

2 ♀, Chechaw State Park, 2 miles NE Albany, Dougherty
County, Georgia, 29-30 Aug. 49.

LITERATURE

- REMPEL, J. G. 1940. Intersexuality in Chironomidae induced by nematode parasitism. Jour. Exp. Zool. 84: 261-289.
- THIENEMANN, A. 1950. Lunzer Chironomiden. Arch. Hydrobiol. Suppl. Bd. 18: 1-202.
- . 1954. Chironomus. Die Binnengewässer Bd. XX Stuttgart (Erwin Nagele), XVI + 834 pp.
- WÜLKER, W. 1961. Untersuchungen über die Intersexualität der Chironomiden (Dipt.) nach *Paramermis*-Infektion. Arch. Hydrobiol. Suppl. 25: 127-181.
- ZSCHOKKE, ER. 1911. Die Tiefseefauna der Seen Mitteleuropas. Eine geographische-faunistische Studie. Leipzig.
-

A New *Chrysura* from Plummers Island, Maryland (Hymenoptera, Chrysididae)

KARL V. KROMBEIN, Entomology Research Division,
Agricultural Research Service, U. S. Department
of Agriculture, Washington 25, D. C.

I am describing this species so that a name will be available for my annotated list of the wasps of Plummers Island, and also for use in my report on the biology of trap-nesting aculeate Hymenoptera. Originally I had thought that the name *hilaris* (Dahlbom) might apply to this species. However, through the courtesy of C. H. Lindroth, Zoological Institute, Lund, Sweden, I have had an opportunity to study Dahlbom's type. I find that it must be retained in the synonymy of *pacifica* (Say).

Superficially, the new species is rather similar in general appearance to *Chrysura smaragdicolor* (Walker). However, *smaragdicolor* differs in genitalia; in the subopaque third sternum; in having the second to fifth flagellar segments of the male strongly rounded out beneath, and the second to fourth with strong metallic reflections above; and in having the male hind femur stouter, its width one-third the length, and with a denser brush of erect white hair on the basal half beneath. It is also distinct from the wide-ranging *pacifica* (Say), which has

quite different genitalia, a comparatively broader head, and the margin of the third tergum with distinct posterolateral angles and a subtruncate apex.

I take pleasure in naming this handsome species for my daughter Kyra, who has helped in some of my trap-nest studies.

***Chrysura kyrae*, new species**

Type. ♂; Plummers Island, MARYLAND; March 26, 1960 (reared from cell 2, nest Y 84 of *Osmia lignaria* Say; K. V. Krombein) [U. S. National Museum, Type No. 66808].

Male. Length 7 mm. Body dark metallic blue with scattered greenish tints on part of clypeus; second sternum with a pair of oval black spots about two-fifths as long as sternum; scape, pedicel and first two flagellar segments above metallic green; wings mostly clear, but with a strong, narrow infumation anteriorly in marginal cell, and with a scattered, diffuse, weak infumation in discoidal cell. Vestiture mostly erect and moderately dense, black on head, on dorsum and sides of thorax, and on abdomen, cinereous to white on clypeus, venter and legs; erect hair on dorsum of head, thorax and apex of abdomen about three times as long as ocellar diameter; antenna with short, decumbent silvery hair, particularly noticeable on first two flagellar segments; hind femur beneath with an erect brush of dense, short white hair on basal third.

Head height (apex of clypeus to vertex) 0.8 times the width; in frontal view the least interocular distance three times the width of an eye; subantennal distance half as long as malar space, 1.2 times as long as interantennal space, and 1.3 times as long as transverse diameter of an anterior ocellus; scapal basin very shallowly concave, almost flat, not margined above by a carina, with small contiguous pits; upper part of front and vertex with larger contiguous pits; ocelli not lidded; first flagellar segment twice as long as second; second to fourth flagellar segments moderately rounded out beneath.

Pronotum with anterior angles right-angled, the surface with large, subcontiguous pits, the interspaces with some micro-punctures; propodeal enclosure with large contiguous pits except

along posterior margin where there is a shallow furrow crossed by a series of short carinae; propodeal tooth acute as viewed from above, arcuate beneath.

Hind femur slender, its length three times the greatest width.

Abdomen dorsally with moderately small punctures, those on disk of first tergum and on anterior two-thirds of second and third terga subcontiguous, those posteriorly on second and third terga more separated; third tergum in profile sloping evenly to posterior margin, the apical margin arcuate and without lateral angles, the subapical row of pits very shallow, poorly defined, and barely impressed; second and third sterna shining.

Allotype. ♀; Plummers Island, Maryland; March 30, 1960 (reared from cell 7, nest Y 92 of *Osmia lignaria* Say; K. V. Krombein) [USNM].

Female. Length 8 mm. Color, vestiture and punctation much as in male: Erect hair on head only twice as long as diameter of ocellus; basal flagellar segments not rounded out beneath; pronotal pits contiguous, micropunctures lacking on interspaces; subapical row of pits on third tergum somewhat more deeply impressed.

Paratypes. 16 ♂♂, 18 ♀♀; Plummers Island, Maryland; reared from cocoons of *Osmia lignaria* Say in wooden borings, with emergence dates under artificial conditions from late January to early April, 1960–1963 (K. V. Krombein) [USNM, KVK]. 3 ♀♀; Plummers Island, Md.; April 25 and 30, 1961, and May 3, 1959 (K. V. Krombein) [USNM, KVK]. 1 ♀, 1 ♂; Loudoun Co., Virginia; extracted November 1937 from cocoons of *Osmia lignaria* in old *Sceliphron* mud-dauber nests (J. C. Bridwell) [USNM]. 1 ♀; #2982, presumably from St. Louis, Missouri (P. Rau) [USNM]. 4 ♀♀; Ripley Co., Indiana; May 6, 1956 (L. Chandler) [Purdue Univeristy]. Paratypes are deposited in the U. S. National Museum, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, Purdue University, and the personal collections of R. M. Bohart, K. W. Cooper and K. V. Krombein.

Paratypes of both sexes are 6 to 10 mm long. They are mostly quite similar to the type and allotype in all essential details. The

pits on the pronotum show some variation in closeness, so that there may or may not be some micropunctures on the interspaces. Occasionally, the apical margin of the third tergum may have a very shallow, narrow median emargination. The black oval spots on the second sternum may be larger, and there may be more green tints on the face or side of thorax.

Biology. Detailed notes on the biology will be presented in a separate contribution. As is apparent from the rearing data, *kyrae* is probably host-specific on *Osmia* (*Osmia*) *lignaria* Say, a species which differs from most of our native *Osmia* in that it uses mud for cell partitions rather than masticated leaf pulp. The female *kyrae* deposits her egg along the side of the pollen-nectar mass of the host bee in April or May a short time before the host egg is deposited. The bee larva hatches in 5 to 7 days, and the chrysidid larva hatches a day later. About a week after hatching the chrysidid larva attaches by its mandibles to the dorsum or side of the host bee larva. It sucks a small amount of blood, but it does not molt or increase much in size until the bee larva spins its cocoon 3 to 4 weeks after hatching and becomes a quiescent larva. Then the chrysidid molts and proceeds to devour the host larva entirely. It spins its own cocoon inside that of the host bee, transforms to a pupa and then to an adult in mid-summer as does the host bee, and remains inside the two cocoons until the following spring. Adults of *kyrae* are active at Plummers Island from as early as April 9 until the end of May.

Correction (Golcondamyia, Tachinidae)

Correction of a tachinid generic name: *Colcondamyia* (*Ent. News*, 74: 82) equals *Golcondamyia*, which is based upon the name of the type locality. Also, Pahvant, Utah, is incorrectly cited as Panvant.—H. J. REINHARD.

Some Summer, Fall and Winter Fleas from Northeastern Tanganyika

C. ANDRESEN HUBBARD, Tigard 23, Oregon
Malaria Institute, Amani, Tanga, Tanganyika

After the ravaging East African floods of October, November, and December, 1961 (which months seemed like Spring to an Oregonian) had passed the amount of rainfall gradually lessened to make January, February and March seem like Summer. Then came the dry. This seemed like Fall. Here at Amani, in the rain forest jungle, the Licorice ferns growing so lush on the trunks of the 100 foot high trees withered, hung limp and prostrate; they seemed dead. At Same, 150 miles to the northwest, the grass was parched, like straw, and the mouse runs were bare to the ground. These trails were being used in common by gerbils, spiny mice, grass mice and tree mice.

In general, as conditions became dryer, fewer fleas were taken off mice and during June the majority examined were without them. The gerbils, however, were the exception, for in spite of the dry and the dust they still carried goodly numbers of their normal fleas *Xenopsylla debilis*, *difficilis* and *humilis*.

During the June, July period new fleas did show up, not perhaps due to season but probably by chance. At Amani more tree squirrels were taken and, from *Paraxerus byatti*, the red bush squirrel, a new species of flea close to *Libyastus wilsoni*, Hubbard, 1963 was secured. From one of the few dormice (*Graphiurus murinus*) was taken a new flea *Dinopsyllus pringlei*, Hubbard, 1963. At Same, during July, the grass mouse *Arvicanthis abyssinicus* became heavily infested with *Xenopsylla cheopis*, the age-old vector of plague, and the ground squirrel *Xerus rutilus* carried a few *Xenopsylla versuta*.

During late July and late September several days were spent at Ngorongoro Crater. This was the most westerly point studied, being about half way across Tanganyika and about 300 miles northwest of Amani. The rim of the Crater is at 8,000 feet, the floor at 5,000, and the diameter is about 11 miles. The floor is a great game reserve and has upon it one of the largest

concentrations of game animals in the World. The vegetation on the rim was still a lush green so the many mice and shrews taken carried numbers of fleas, most of which, due to the elevation, were new in Tanganyika collections. Collected as new for the State were:

Nosopsyllus incisus, J. and R., 1913, off *Dendromus m. kili-manjari*.

Listropsylla basilevskyi, Smit, 1960, off *Rhabdomys p. diminutus*.

Dinopsyllus longifrons, J. and R., 1913, off *Otomys a. elassodon*.

Dinopsyllus grypus, J. and R., 1913, off *Praomys d. octomastis*.

Xiphiopsylla lippa, Jordan, 1933, off *Mus t. murillus*.

Ctenophthalmus verutus, Smit, 1960, off *Lophuromys f. aquilus*.

Ctenophthalmus cophurus hemmingwayi, Hubbard, 1963, off *Lophuromys f. aquilus*.

Ctenophthalmus evidens wilkesi, Hubbard, 1963, off *Lophuromys f. aquilus*.

Ctenophthalmus acanthurus, J. and R., 1913, off *Crocidura o. kijabae*.

Hypsophthalmus campestris, J. and R., 1913, off *Rabdomys p. diminutus*.

These items from Ngorongoro Crater bring to 30 the number of species and subspecies of fleas recovered from about 1,000 rodents collected and examined during the first year of study in Tanganyika under Fulbright and National Science Foundation grants. This paper is the fourteenth in a series on World fleas under N.S.F. Grant 14023 and the fourth under the Fulbright grant.

The work is carried out under Governor's Licence No. 20/1961 of the Government of Tanganyika.

Readers sufficiently interested in African fleas to pay transportation costs are welcome to same and the writer will try to fill all needs. Write to 15115 S.W. 74th Avenue, Tigard 23, Oregon.

For the Spring fleas taken in Tanganyika see ENT. NEWS 73: 225-232, Nov., 1962.

A Holotype Problem and a New Specific Name in *Pseudochaeta* (Diptera: Tachinidae)

CURTIS W. SABROSKY¹ and PAUL H. ARNAUD, JR.²

In the tachinid genus *Pseudochaeta* Coquillett, a problem of holotype designation requires a note of explanation.

Coquillett (1895) described a new species, *Pseudochaeta argentifrons*, from "Charlotte Harbor, Florida (Mrs. A. T. Slosson), and Los Angeles, California (D. W. Coquillett). Four males and three females."

In 1941, Townsend listed *argentifrons* as the type-species of the genus, with "Ht Male, At Female—Origin, Charlotte Harbor, Florida; location Washington." Brooks (1945), following Townsend, applied the name *argentifrons* to a southeastern species, and distinguished a closely related northern and western species which he named *canadensis*. Reinhard's (1946) revision of the genus followed the interpretations by Townsend and Brooks.

However, in his famous "Revision of the Tachinidae" (1897), Coquillett, after giving several key characters for *argentifrons*, stated "From the type specimen," and this statement appears to us to fix the type of the species, well in advance of the statement by Townsend. In the collection of the U. S. National Museum, the red "Type" label, No. 3621, numbered in Coquillett's characteristic handwriting, is on a male from "Los Angeles Co., Cal.," and this was so entered in the Museum's type book by Coquillett himself on May 22, 1899. Unfortunately, this specimen is the western species described by Brooks as *Pseudochaeta canadensis*, which thus falls as a synonym of *argentifrons*. For the southeastern species, which now lacks a name, we propose *Pseudochaeta brooksi*, in honor of the late A. R. Brooks. We validate the name by bibliographic reference to the description of "*argentifrons*" by Reinhard (1946, *Canad. Ent.* 78: 116-117). The

¹ Entomology Research Division, Agric. Res. Ser., U. S. Department of Agriculture, Washington, D. C.

² Research Fellow, Department of Entomology, American Museum of Natural History, New York, and Research Entomologist, Department of Entomology, California Academy of Sciences, San Francisco.

type series is composed of the 25 specimens listed by Reinhard as "Material examined," and from these, some of which are now before us, we have selected the male from Charlotte Harbor, Florida, as holotype. This specimen was presumably part of the original mixed-type series of *argentifrons*.

Incidentally, Coquillett's "type" from California has the precise key character (of Coquillett's 1897 revision) of the third antennal segment in the male five times as long as the second, but this character does not apply to the southeastern species represented by the material from Charlotte Harbor, Florida.

With reference to Townsend's 1941 statement, we note that no "type," "holotype," or "lectotype" labels were applied to specimens of this or any other species for which Townsend published such designations in his Manual. It is true that the International Code of Zoological Nomenclature does not require such labeling as a part of the acceptability of a designation. This failure, and the virtual certainty that Townsend made many such designations from the literature alone, mean that sometimes one cannot identify which specimen is intended and that sometimes a designation is contrary to fact in the type series itself, as in the present case. For *argentifrons*, Coquillett published a type designation ("From the type specimen") and labeled the specimen in the collection. His action has priority, as well as being better taxonomic procedure, and we believe that it must take precedence over Townsend's 1941 action.

LITERATURE CITED

- BROOKS, A. R., 1945. New Canadian Diptera (Tachinidae). *Canad. Ent.* 77: 78-96.
- COQUILLET, D. W., 1895. Descriptions of new genera and species. pp. 307-319. *In* Johnson, C. W., *Diptera of Florida*. Acad. Nat. Sci. Phila. Proc. 1895: 303-340.
- COQUILLET, D. W., 1897. Revision of the Tachinidae of America north of Mexico. A family of parasitic two-winged insects. U. S. Dept. Agric., Div. Ent., Tech. Ser. 7: 1-156.
- REINHARD, H. J., 1946. The tachinid genera *Pseudochacta* and *Phaenopsis* in North America (Diptera). *Canad. Ent.* 78: 111-121.
- TOWNSEND, C. H. T., 1941. Manual of myiology. Part XI. Oestroid generic diagnoses and data. Goniini to Trypherini. Sao Paulo, Brazil. 342 pp.

Six New Reared Species of *Bracon* (Hymenoptera: Braconidae)

C. F. W. MUESEBECK, United States National Museum

The collections of the National Museum contain many undescribed Nearctic species of the genus *Bracon* F. My synopsis of the group (Proc. U. S. Nat. Mus., vol. 67, Art. 8, pp. 1-85, 1925) is decidedly out of date, but the preparation of a revision at this time is not practicable. Accordingly, it is necessary to describe isolated species in order to make names available to workers who need them in connection with biological or ecological studies. Six species are described here, three of them reared from lepidopterous larvae, two from larvae of Coleoptera and one from larvae of a species of Hymenoptera.

Bracon agathymi, new species

This most closely resembles *B. platynotae* (Cushman), but it is conspicuously larger; the antennae have more segments; the ovipositor sheath is longer; the basal tergites of the abdomen are more coarsely sculptured, and the eyes are relatively much smaller and the malar space correspondingly longer.

Female: Length usually about 4 mm. Temples relatively broad and not receding from eye margins; face three times as wide as distance from antennal foramina to clypeus, its surface coriaceous; opening between clypeus and mandibles large, its transverse diameter subequal to length of malar space, which is more than half the eye height; frons, vertex and temples sculptured like the face; antennae usually 29- to 31-segmented (26-segmented in an unusually small specimen of the type series), slender, even the shortest segments much longer than broad.

Thorax stout, a little wider than head; mesoscutum, scutellum, pleura and propodeum very finely alutaceous; notauli indicated by shallow, densely hairy impressions; mesonotal lobes with scattered hairs, the scutellum rather closely hairy; propodeum without a stub of a median carina at apex; first abscissa of radius at least as long as, usually longer than, the second which is

shorter than first intercubitus and less than one-third as long as third abscissa of radius; radial cell ending a little above apex of wing; second abscissa of cubitus nearly or quite as long as recurrent vein.

Abdomen stout; first tergite largely granularly sculptured; second and base of third rugose, the second noticeably longer than the third; third tergite apically and all of fourth and fifth tergites strongly granularly sculptured; suturiform articulation nearly straight, broad and coarsely foveate; ovipositor sheath longer than hind tibia.

Head brownish yellow, with a large transverse spot on face, and the frons and vertex except at the eye margins, blackish; occiput more or less darkened; antennae dark brown to black, the scape more or less yellow below. Thorax black; wings infumated, weakly so on apical third, stigma and veins dark; legs testaceous or yellowish brown, the tibiae and tarsi piceous to blackish. Abdomen brownish yellow, the first tergite a little darkened.

Male: Like the female, but the legs darker, especially the coxae and trochanters; antennae usually 32- to 34-segmented but with as few as 24 segments in one very small specimen of the type series.

Type: U. S. National Museum No. 66600.

Type-locality: Prescott, ARIZONA.

Described from 9 females (one the holotype) and 4 males reared in 1961 at the type locality from *Agathymus neumocgini* (Edwards); 3 females and 2 males from the Catalina Mts., Pima County, Arizona, reared in May, 1962, from *A. arxna* (Dyar), and 3 females and 1 male from Marathon, Texas, reared September 27, 1960, from *A. mcilpinei* (Freeman). All the specimens were reared by Dr. Killian Roever, of the University of Arizona.

***Bracon acrobasidis*, new species**

This suggests *B. politiventris* (Cushman), which it closely resembles in the antennae, in wing venation and in the sculpture of the abdomen. It differs strikingly from that species, however, in having the thorax coriaceous and more or less dull.

Female: Length around 2.5 mm. Head not thin but temples narrow, less than half as wide as eyes, which are large; malar space a little shorter than basal width of mandible; face, frons, vertex, temples and cheeks coriaceous and somewhat dull; antennae normally 22- to 26-segmented, all flagellar segments distinctly longer than broad, the first the longest, the remainder subequal in length but gradually thinner.

Thorax short and stout, dorsally finely coriaceous; notauli indistinct; mesoscutum, including surface of the middle lobe, and the scutellum, thickly hairy; propodeum finely coriaceous, rather shining, and without a distinct stub of a median carina at apex; mesopleuron largely smooth and shining. First abscissa of radius about half as long as the second, the latter much more than half the length of the third which almost attains extreme apex of wing; second abscissa of cubitus very nearly or quite as long as recurrent vein, sometimes even longer.

Abdomen broader than thorax; second tergite slightly longer than third, punctate or with fine reticulate sculpture, and with two longitudinal, slightly rugose grooves medially; suturiform articulation gently arcuate and finely foveolate; third, fourth and fifth tergites very shiny and with more or less very weak, reticulate sculpture; ovipositor sheath a little shorter than hind tibia.

Head yellowish brown, the frons and vertex medially and the occiput darkened; antennae entirely brownish black; thorax usually largely black or blackish, with lateral face of pronotum and lines of notauli yellowish brown; sometimes thorax more extensively yellowish brown, with only mesonotal lobes, propodeum and pectus darkened; legs yellow, the tibiae and tarsi more or less infuscated; wings infumated on basal two-thirds, hyaline apically; abdomen usually dark brown, with the second tergite broadly, and the following narrowly, yellow at the sides.

Male: Like the female, but the antennae, the thorax and the abdomen are more slender; the antennae are normally 25- to 29-segmented.

Type: U. S. National Museum No. 66601.

Type-locality: Monticello, FLORIDA.

Described from many specimens of both sexes reared at the type locality from *Acrobasis caryae* Grote and *A. caryivorella* Ragonot in 1941, 1942 and 1944. The holotype is labeled "Ex *Acrobasis caryae*, Monticello, Fla., v.1941, W. C. Pierce." The Museum also has 3 specimens of this species which were reared from *Acrobasis comptoniella* Hulst at New Lisbon, New Jersey, June 21, 1935, by E. P. Darlington.

***Bracon rosaceani*, new species**

Like *B. acrobasidis*, described just above, this form is superficially most similar to *B. politiventris* (Cushman). It is readily distinguished from that species, however, by its strongly sculptured abdomen, black tegulae, almost completely black head and darker legs.

Female: Length around 2.5 mm. Head about as broad as thorax and, seen from above, nearly twice as broad as long; face twice as broad as distance between antennae and clypeus, uniformly coriaceous and somewhat dull; frons, vertex and malar space sculptured like the face; temples and cheeks smooth and shining; malar space one-third as long as eye height and about equal to transverse diameter of opening between clypeus and mandibles; antennae normally 20- to 24-segmented (17-segmented in an unusually tiny specimen); all flagellar segments at least one and one-half times as long as broad.

Mesoscutum and scutellum smooth and shining; middle lobe of mesoscutum bare except for a few hairs anteriorly; notauli very weak but their position indicated by rows of long, closely placed hairs; mesopleuron smooth and polished, hairy; propodeum weakly alutaceous. Hind coxae smooth. First abscissa of radius a little shorter than second which is slightly longer than first intercubitus and less than half as long as third abscissa of radius; radial cell not quite attaining apex of wing; second abscissa of cubitus a little shorter than recurrent vein.

Abdomen broader than thorax; first tergite largely smooth and shiny; second longer than third, granularly sculptured and with a rugulose area medially at base where there are two more or less distinct, short, oblique, rugulose grooves; posterior margin

of second tergite nearly straight; suturiform articulation foveolate; third, fourth and fifth tergites finely granular or coriaceous; ovipositor sheath about as long as hind femur.

Head black, narrowly orange along inner and upper eye margins; antennae and palpi black; mandibles brownish yellow; thorax black; tegulae black; legs black, with only apices of femora and bases of tibiae pale; abdomen black or blackish above, brownish yellow along sides of tergites, the venter pale; wings distinctly infumated on basal two-thirds, clear apically.

Male: In general smaller and more slender than female and with the tergites more weakly sculptured; antennae of available specimens 20- to 23-segmented; all flagellar segments twice as long as broad.

Type: U. S. National Museum No. 66602.

Type-locality: Gresham, OREGON.

Described from 30 females (one the holotype) and 8 males, all reared at the type locality from *Archips rosaceanus* (Harris) in May, June, July and August, 1944. The holotype was reared June 20, 1944 by "J. S. & H. J. O."

Bracon gossypii, new species

This species is most similar to *B. nuperus* Cresson but it differs in its relatively shorter second tergite, normally yellow face and thorax, finely sculptured face and shorter ovipositor sheath.

Female: Length usually within the range of 2.5 to 3.5 mm. Head thin, twice as wide as long seen from above; eyes very narrow; temples barely receding and at least three-fourths as wide as eyes; face vertical and finely coriaceous except for a smooth spot medially; frons smooth and polished; transverse diameter of opening between clypeus and mandibles more than one and one-half times the length of malar space which is less than basal width of mandible; antennae usually 23- to 26-segmented.

Thorax entirely smooth and polished; notauli weak, subparallel, widely separated at scutellar furrow; propodeum smooth and polished and without a stub of a median carina at apex. Forewing with second abscissa of radius less than twice

as long as first and little more than half as long as third which attains wing margin well before apex; second abscissa of cubitus a little shorter than recurrent vein.

Abdomen as wide as thorax; second tergite shorter than third and usually weakly and very finely longitudinally aciculate but occasionally completely smooth; suturiform articulation nearly straight and finely foveolate; third and following tergites normally smooth and polished, the third occasionally weakly longitudinally aciculate basally; ovipositor sheath barely longer than abdomen.

Yellow; head black or piceous above, sometimes entirely darkened except for the face and cheeks; antennae entirely dark; thorax usually yellow but sometimes with blackish markings on mesonotal lobes, pleura and pectus; legs yellow with hind tibiae and tarsi more or less darkened; wings lightly infumated basally, hyaline at apices, costal margin and stigma conspicuously yellowish, the latter somewhat brownish apically; abdomen yellow.

Male: Essentially like the female but averaging smaller in size and usually with the thorax more extensively darkened.

Type: U. S. National Museum No. 66603.

Type-locality: Bennettsville, SOUTH CAROLINA.

Described from 13 females (one the holotype) and 13 males reared by C. F. Rainwater from boll weevil infested cotton squares at various localities in South Carolina in August and September, 1936, the holotype and allotype on August 26; and 6 females collected on croton weed, Tallulah, Louisiana, August 7, 1944, by G. L. Smith. The National Museum collection contains many additional specimens, most of them reared or collected from cotton, at localities in Georgia, Mississippi, South Carolina, Louisiana, Texas, Florida and Arkansas. Most of the specimens bear labels indicating that the host was thought to have been *Anthonomus grandis* Boh. but there seems to be no firm record of actual rearing from boll weevil larvae.

***Bracon bruchivorus*, new species**

This is very similar to *B. tychei* (Muesebeck) but it differs in its non-receding temples and in having the propodeum, abdomen and hind femora testaceous.

Female: Length around 3.5 mm. Head hardly as wide as thorax and not nearly twice as wide as long as seen from above; eyes large; temples more than half as wide as eyes, parallel, not at all receding; face not twice as wide as high; face, frons, vertex and temples smooth and shining; malar space less than one-third as long as eye height and shorter than transverse diameter of opening between clypeus and mandibles; antennae 27- to 31-segmented in the available specimens, the flagellum filiform, apical fourth barely thinner than basal fourth, all flagellar segments subequal in length, the first not longer than the second, and all much longer than broad.

Thorax stout, smooth and polished; mesoscutum glabrous except for long, closely placed hairs in notauli; notauli weak but distinct, strongly convergent but still separated at scutellar furrow; propodeum entirely smooth and polished and without a stub of a median carina at apex. Hind femora relatively broad, about one-fourth as broad as long. Second abscissa of radius twice as long as the first and two-thirds as long as the third which reaches wing margin well before apex; second abscissa of cubitus less than half as long as recurrent vein.

Abdomen a little broader than thorax, smooth and shining; second tergite slightly shorter than third and with two elongate pits or short longitudinal grooves medially at base; suturiform articulation rather broad but not at all foveolate, weakly arcuate medially and curved forward at the sides; ovipositor sheath very nearly or quite as long as abdomen.

Head entirely black, including palpi and antennae, only the mandibles yellowish basally; thorax usually black with propodeum bright testaceous except for a large median basal patch; scutellum and pectus sometimes more or less brownish; anterior and middle legs with coxae, trochanters, bases of femora, tibiae on outer margins and the tarsi, piceous; hind legs testaceous, the coxae usually streaked with black above and below, the trochanters sometimes piceous, the tibiae and tarsi black or blackish; wings infumated, more weakly so apically, stigma and veins brownish black; abdomen entirely testaceous.

Male: Thorax, including propodeum, usually entirely black; legs often more extensively darkened than in the female al-

though the hind femora are nearly always testaceous; abdomen sometimes with irregular blackish areas on first, third, fourth and fifth tergites.

Type: U. S. National Museum No. 66604.

Type-locality: Turlock, CALIFORNIA.

Described from 6 females (one the holotype) and 6 males from the type locality, reared by E. L. Mayer March 4, 1953, from beans infested with bruchids; 2 females and 1 male from Modesto, California, reared from bruchids in blackeye cowpeas by E. L. Mayer December 9, 1952; 4 females and 1 male labeled "Ex *Acanthoscelides* sp. near *fraterculus* (Horn) on lotus, Visalia, California, F. T. Scott;" and 1 female from blackeye cowpeas at Modesto, California, in August, 1952, by L. F. Baker.

Bracon jani, new species

Structurally this is very similar to *B. pini* (Muesebeck), but the antennae are decidedly more slender and usually have fewer segments; the temples are more strongly receding and a little narrower; the second tergite is more weakly, and not longitudinally, sculptured; and the ovipositor sheath is rather abruptly a little broadened on apical fourth, which is not true in *pini*. In color *jani* is generally paler, the head and thorax especially being usually extensively yellow; and the wings are clear hyaline apically.

Female: Length around 2.3 mm. Head seen from above nearly twice as broad as long but not thin, the face, in lateral view, strongly receding; face, frons, vertex and temples smooth and shining; temples strongly receding, about half as wide as eyes; length of malar space less than half the transverse diameter of the opening between clypeus and mandibles and not longer than pedicel of antenna; antennae 27- to 29-segmented in the available specimens, all flagellar segments about twice as long as broad.

Thorax entirely smooth and polished; notauli impressed only anteriorly. First abscissa of radius a little longer than width of stigma and more than half as long as second abscissa of radius

which is about half as long as the third; second abscissa of cubitus less than half as long as recurrent vein.

Abdomen short and broad, only a little longer beyond first segment than its greatest width; second tergite about as long as third, weakly confluent punctate medially, smooth laterally, its posterior margin broadly and weakly excavated at the middle; suturiform articulation rather wide but not distinctly foveolate; third tergite with a little very shallow, confluent punctation medially near base; following tergites successively much shorter, smooth and shining; ovipositor sheath a little longer than hind tibia, the apical fourth a little broadened.

Face and cheeks usually testaceous; frons, vertex and occiput more or less piceous; thorax testaceous but with more or less extensive piceous markings, the palest specimen having only the propodeum dark, the darkest being almost entirely piceous; forewing very slightly infumated on basal two-thirds, clear hyaline apically; hind wing with a conspicuous fuscous spot at base of radiellian cell; tegulae yellow; legs including all coxae yellow, with hind tibiae and hind tarsi dusky; abdomen usually largely yellowish but more or less piceous down the middle.

Male: Like the female in essential characters; antennae of the only available male 27-segmented.

Type: U. S. National Museum No. 66605.

Type-locality: Cloquet, MINNESOTA.

Described from 5 females (one the holotype) and 1 male reared by E. Osgood from larvae of the cephid *Janus abbreviatus* (Say), a borer in the twigs of willow and poplar, one of the paratypes January 2, 1961, the other specimens December 22, 1959.

Notes and News in Entomology

Under this heading we present from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when needed.

Robert E. Snodgrass. The portrait (frontispiece of this issue) was kindly supplied to the NEWS by Mrs. Snodgrass. It was taken in 1932 while Dr. Snodgrass was attending the International Congress of Entomology. He was then 57 years of age and was working on his famous "Principles of Insect Morphology" that was published in 1935. This book, we are informed, is now being translated also into the Hindi language, and McGraw-Hill has signed a contract with the Indian Government for 3,000 copies, to be finished about 1967.

Shortly after his death, the Robert E. Snodgrass Memorial Fund was established by the family and his friends. This fund, which is to be used to assist worthy entomological students, is being handled by the Entomological Society of America, Mr. R. H. Nelson, Executive Secretary, 4603 Calvert Road, College Park, Maryland. Mr. Nelson will gladly accept further donations.

Dr. J. Linsley Gressitt, Entomologist and Chairman of the Department of Entomology at Bishop Museum, Honolulu, has been named recipient of the Linus Allen Bishop Distinguished Chair of Zoology by the Trustees of the Museum. This appointment, the first of its kind at the Museum, is in recognition of Dr. Gressitt's outstanding contributions to the entomology of the Pacific area and of his leadership as a senior member of the scientific staff in developing the Museum's Department of Entomology. The new chair was endowed by the late Linus Allen Bishop, a nephew of E. Faxon Bishop who was in turn a nephew of Charles Reed Bishop, the founder of the Museum.

Museum officials indicate that the dynamic program in entomology developed by Dr. Gressitt is largely responsible for support of a new entomology building at the Museum. A grant of \$300,000 has been made by the National Science Foundation,

and the construction of a three-story research building will begin this spring.

Transactions of the American Entomological Society In addition to Vols. 1-5 previously made available on microcards, Vols. 6-13, may now also be had on cards from the J. S. Canner & Co., 618 Parker Street, Boston, Roxbury 20, Mass. Price: Vols. 6-13, \$30.50; Vols. 1-13, \$52.50. The original Vols. 1 to 5 have been out of print for some time, but the American Entomological Society still has for sale a limited number of originals of Vols. 6 to 13.

Review

TO KNOW A FLY by **Vincent G. Dethier**, with a foreword by N. Tinbergen. Pp. viii + 118, illus. Holden-Day, Inc., San Francisco, 1962. Price, \$3.75.

This little book is hard to describe but fun to read. It tells what a scientist does, from securing a grant ("game of grantsmanship") to publishing results, and, in between, the step-by-step exploration of the sensory physiology and behavior of the blow-fly. It often reads like tomfoolery but, amazingly, is mostly solid science. About 20 full-page cartoons by the author enliven the tale and may impart instant insight. Thus, one page shows an explosion with mushroom cloud, and two flies in the foreground commenting: "*There is one advantage in our inability to make decisions—we never make the wrong ones.*" This says that only man, who has abandoned instinct as a guide to behavior, could develop social institutions and inventions that in the end can utterly destroy him.

Just as great wisdom is found hidden in Lewis Carroll and Don Marquis, quotes from whom are at heads of chapters, so in Dethier we find great science told in everyday language that often seems akin to persiflage to one accustomed to usual scientific writing.—R. G. S.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) urgently required. Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address:

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 Race Street, Philadelphia 3, Pennsylvania

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and *Aedes aegypti* and *Culex quinquefasciatus*

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

Insects
ENTOMOLOGICAL NEWS

JULY 1963

Vol. LXXIV

No. 7

CONTENTS

Roback—New Neotropica <i>Coelotanypus</i> (Dipt.)	169
Porter—New locality records for <i>Polistes exclamans</i> (Hym.) ..	176
Krombein—New <i>Tachysphex</i> from S E United States (Hym.)	177
Engelmann—A respirometer for small arthropods	181
Gillaspy—New genera and a n.sp. <i>Bembicini</i> from N. America .	187
Wiley and Wiley—Range extension of <i>Cyphoderris</i> (Orth.) ..	200
Hull—A new species of <i>Laphystia</i> (Dipt.)	202
A generous legacy from Frank Morton Jones	203

**PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.**

**AND
1900 RACE STREET, PHILADELPHIA 3, PA.**

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to **Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXXIV

JULY, 1963

No. 7

New Neotropical *Coelotanypus* (Diptera, Tendi- pediae, Pelopiinae)

SELWYN S. ROBACK, Curator, Department of Limnology,
Academy of Natural Sciences of Philadelphia

The following new species of Neotropical *Coelotanypus* were found in the course of an investigation of the North American Pelopiinae.¹ All figures, with the exception of numbers 8, 9, 15, 16, 26, were made from slide mounts. The disposition of the types is indicated at the end of each species description.

Coelotanypus feris n. sp.

The broad single brown wing band, Fig. 1, and frontal projection, Fig. 11, 15, will separate this species from the other Nearctic and Neotropical species of this genus. *C. delpontei* Edw. (♂) has two bands on the wing and a yellow abdomen.

Female.—Length 3.1 mm (paratype 2.7 mm); head dark brown; frons with raised shelf between antennal bases, Figs. 11, 15; antennal flagellum light brown, Fig. 12; segments in ratio 7:3:3:4:4:4:4:4:4:4:15; pedicel dark brown; ratio of interocular distance to dorsal eye extension 6.5; palpi light brown.

Pronotum black brown; lobes touching at midline; not mesally narrowed; some long hairs ventro-laterally; mesonotum shining black; humeri, scutellum and postnotum black; vittae not distinct; mesonotal spur black, not greatly pronounced; pleurae and sternum brown; pleurae densely gray-green pollinose.

¹ The support of the National Science Foundation in this project is gratefully acknowledged.

Foreleg ratio .69 (paratype .72); mesothoracic leg ratio .47 (paratype .50); hind leg missing (paratype leg ratio .59); foreleg entirely black; mesothoracic leg with femur, tibia, tarsal segments 2-5 black; first tarsal segment light with only apex black; metathoracic leg (from paratype) colored as mesothoracic leg; foretibia with single apical spur, Fig. 14; mesotibia with 2 spurs, Fig. 13; metatibia with 2 spurs and double row of filaments as in Fig. 19.

Wing 2.8 mm long (paratype 2.4 mm) with broad brown band extending from basad of *r-m* to apex of R_{2+3} and below and behind *Cu*; wing apex appears whitish; Fig. 1; membrane around *r-m* strongly infuscated; Fig. 2; *m-cu* below *r-m*; *r-m* .40 from arculus to wing tip.

Abdomen shining black; venter lighter black-brown.

Holotype ♀, Kwakoeegron, Saramacca River, SURINAM. June 11, 1927. In collection of Cornell University.

Paratype ♀, Bartica, British Guiana 12-14-1912. Coll. H. S. Parish. In collection of Cornell University.

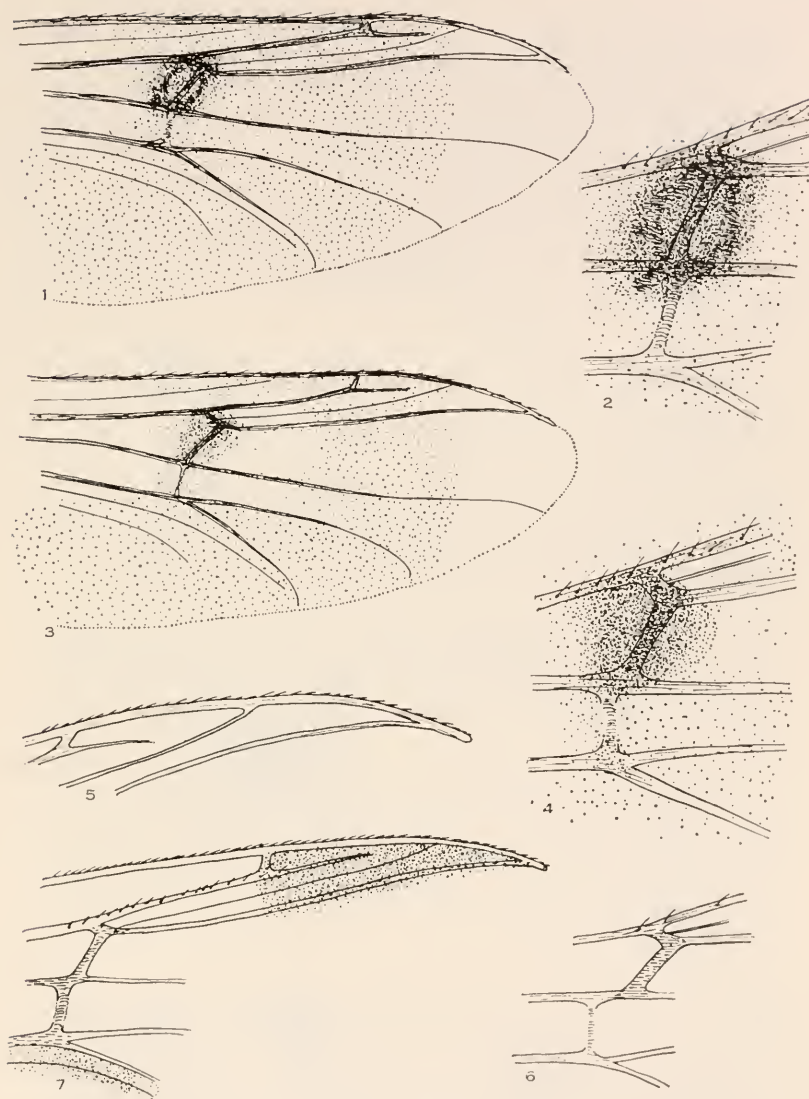
***Coelotanypus naelis* n. sp.**

This species on the basis of the wing banding and presence of a frontal projection is related to *C. feris*. It can be separated by the clear areas in the wing band, Fig. 3, the lower frontal projection Fig. 16, the light mesal bands on the mesothoracic and metathoracic tibiae and the light basal three fourths of the first foretarsal segment. The wing membrane around *r-m* is less densely infuscated than in *C. feris*.

Female.—Length 2.5 mm; head dark brown; frons with a low raised area. Fig. 16; antennae missing; palpi dark brown.

Pronotum dark brown, lobes mesally approximated; some long hairs ventro-laterally; mesonotum brown; humeri lighter but not markedly so; vittae not distinct; scutellum lighter brown; postnotum black-brown; mesonotal tubercle large, brown; pleurae lighter brown; sternum dark brown.

Foreleg ratio .66; meso and metatarsal segments missing; all femora brown; tibiae of fore-mesothoracic legs all brown; meta-



Coelotanyus feris Roback. FIG. 1—Wing. FIG. 2—Detail of crossveins.
Coelotanyus naelis Roback. FIG. 3—Wing. FIG. 4—Detail of crossveins.

Coelotanyus cletis Roback. FIG. 5—Detail of apex of radial sector. FIG. 6—Detail of crossveins.

Coelotanyus amoensis Roback. FIG. 7—Detail of crossveins and radial sector.

thoracic tibia brown with a narrow light band two thirds from base; first tarsal segment of foreleg light with apex brown.

Wing 2.4 mm; brown band, Fig. 3, with light area distad of *r-m*; wing membrane around *r-m* lightly infuscated; *r-m* .36 from arculus to wing tip; halteres light.

Abdomen wholly brown, densely covered with light hairs.

Holotype ♀ Kwakoebron, Saramacca River, SURINAM, June 10, 1927. In collection of Cornell University.

***Coelotanypus amoenis* n. sp.**

The wing maculation, Fig. 7, will separate this robust species from the known New World species of this genus.

Female length 4.2 mm; head brown; frons wide and smooth, Fig. 9; antennal flagellum light brown; apical segment darker; flagellar segments in ratio 6:4:5:5:5:5:5:5:5:5:17; pedicel brown; ratio of interocular distance to dorsal eye extension 20; palpi brown.

Pronotum, Fig. 8, orange-brown, mesonotum reddish brown; vittae indistinct orange-brown; median vitta with antero-lateral margins blackish; humeri slightly lighter; scutellum and postnotum orange-brown; pleurae orange-brown, sternum orange-brown.

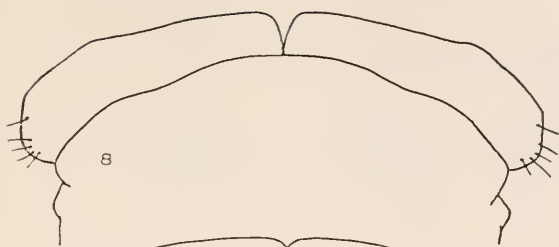
Foreleg ratio .62; metathoracic leg ratio .71; mesotarsi missing; femora orange-brown; foretibia black, mesotibia with basal third darkened and apex dark brown; metatibia orange-brown with apex dark brown; foretarsi all black, metatarsi 1 and 2 orange with brown apex; tarsi 3-5 black; tibial spurs typical for the genus.

Wing 3.8 mm long; membrane distad of apex of R_1 and above R_{4+5} dark, Fig. 7; some darkening below *Cu* also; *r-m* darkened

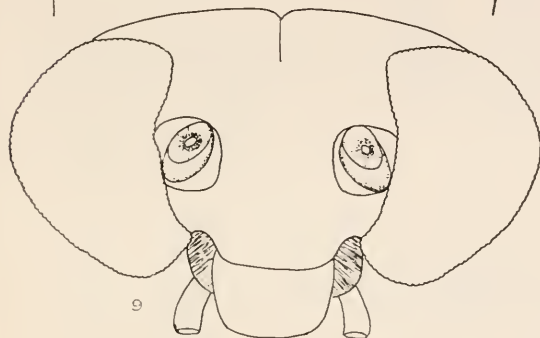
Coelotanypus amoenis Roback. FIG. 8—Pronotum dorsal view. FIG. 9—Head. FIG. 10—Apex of female antenna.

Coelotanypus feris Roback. FIG. 11—Head. FIG. 12—Apex of female antenna. FIG. 13—Mesotibial spurs. FIG. 14—Foretibial spur. FIG. 15—Profile of head.

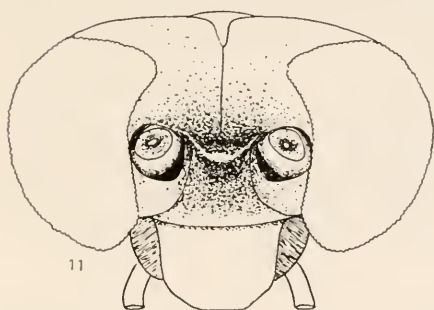
Coelotanypus naelis Roback. FIG. 16—Profile of head.



8



9



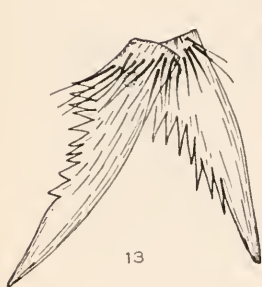
11



10



12



13



14



15



16

but surrounding membrane not infuscated; $r-m$.39 from arculus to wing tip; halteres light orange-brown.

Abdomen shining black.

Holotype ♀, Manãos, BRAZIL 7-9 September 1920. C. U. Expedition. In collection of Cornell University.

Coelotanypus cletis n. sp.

This species is closely related to *C. scapularis* but can be separated by the abdominal maculation and the spurs on T1 and T2 of the foreleg, Figs. 20, 22.

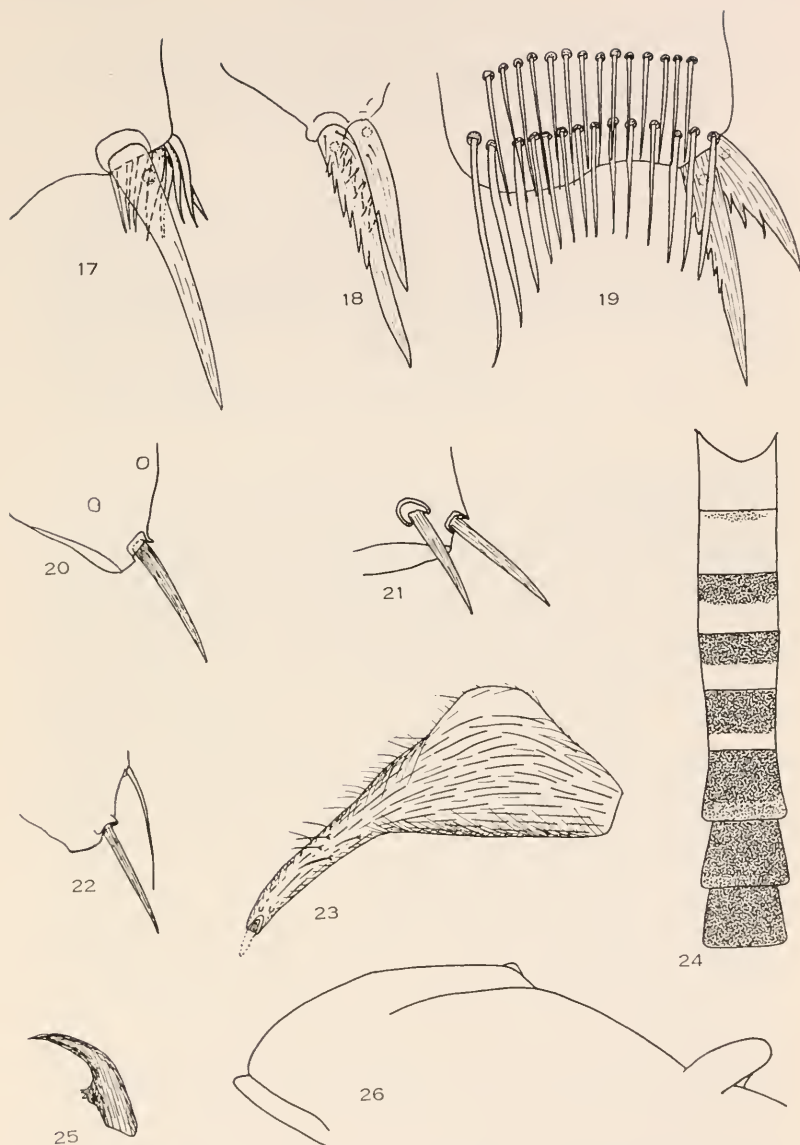
Male 3.1 mm long; head brown; antennal ratio 2.8; pedicel dark brown; palpi light brown; pronotum light, some brown caudo-mesally; mesonotum black brown; humeri light; vittae indistinct; mesonotal tubercle light, relatively prominent, Fig. 26; pleurae light, sternum black-brown; scutellum light brown; postnotum black brown.

Foreleg ratio .74; mesothoracic leg ratio .62; metathoracic leg .67; femora brown; tibiae with basal third and apex dark black brown; first tarsal segments of all legs light with black-brown apices; tarsal segments 2-5 black; claw as in Fig. 25; foretibia with single spur and comb of about 8 light filaments, Fig. 17; first and second foretarsal segments with apparently only one apical spur, Figs. 20, 22; mesotibia with two apical spurs, Fig. 18; tarsal segments 1-3 with 2 apical spurs, Fig. 21; metatibia with 2 apical spurs and a double row of filaments, 14 in each row, Fig. 19; tarsi 1-3 as in mesothoracic leg.

Wing 2.8 mm long; apex of radial sector as in Fig. 5; $r-m$.41 from arculus to wing tip; $r-m$ darkened but surrounding membrane not infuscated, Fig. 6; $m-cu$ distinctly basad of $r-m$; fCu slightly petiolate; halteres light.

Abdomen marked as in Fig. 24; genitalia dark brown basistyle .26 mm long; distyle, Fig. 23, .11 mm long; apical spur missing.

Holotype ♂ Montego Bay JAMAICA January 19, W. S. Brooks. In collection of Museum of Comparative Zoology, Harvard University.



Coclotanypus cletis Roback. FIG. 17—Foretibial spur and comb. FIG. 18—Mesotibial spurs. FIG. 19—Metatibial spurs and combs. FIG. 20—Spur of T1 of foreleg. FIG. 21—Spurs of T1 of mesothoracic leg. FIG. 22—Spur of T2 of foreleg. FIG. 23—Distyle. FIG. 24—Abdomen. FIG. 25—Claw. FIG. 26—Profile of thorax.

LITERATURE

- EDWARDS, F. W. 1931. Diptera of Patagonia and South Chile Part II, Fasc.-5, Chironomidae. Brit. Mus. (N.H.) Appendix: 317-324.
-

Some New Locality Records for the Social Wasp *Polistes exclamans* Viereck (Hymenoptera, Vespidae)

CHARLES C. PORTER, Biological Laboratories, Harvard
University, Cambridge, Massachusetts

In the catalog of North American Hymenoptera by Muesebeck, Krombein, Townes *et al.* (*United States Department of Agriculture, Agriculture Monograph No. 2*) *Polistes exclamans* is recorded from no point farther north on the Atlantic Coast than North Carolina. During recent years, however, I have collected this wasp in some abundance at several localities on the Eastern Shore of Maryland and in central and southern New Jersey. Since these records outline a considerable apparent range extension, I have thought it worthwhile to list them below, together with a few brief notes on the circumstances of capture.

Salisbury, Maryland: July 16, 1960. 2 specimens retained. Many nests in Red Cedar Trees.

Cambridge, Maryland: September 1, 1960. 12 specimens retained. Many nests in Red Cedars.

Penn State Forest, New Jersey (Pine Barrens): September 10, 1955. 2 specimens retained. A single nest observed in a Red Cedar on the shore of Lake Oswego.

Lebanon State Forest, New Jersey (Pine Barrens): September 10, 1960. 1 specimen collected in flight, no nest observed.

Metuchen, New Jersey (Piedmont): August 21, 1960. 2 specimens collected in flight at a truck farm west of town along the Reading Railroad, no nests.

A New *Tachysphex* from Southeastern United States (Hymenoptera, Sphecidae)

KARL V. KROMBEIN, Ent. Res. Div., Agr. Res. Ser.,
U. S. Department of Agriculture, Washington, D. C.

This new *Tachysphex* from coastal North Carolina and Florida is being described at this time so that a name will be available for F. E. Kurczewski's study of the behavioral characteristics of the North American species. I take pleasure in naming it for R. M. Bohart, University of California at Davis, whose current studies on larrine wasps are helping to clarify the confused and difficult taxonomy of the group.

Tachysphex boharti, new species

Tachysphex n. sp., Krombein, 1950. Jour. Elisha Mitchell Sci. Soc. 65: 267 (2 ♀♀; Kill Devil Hills, N. C.).—Krombein, 1953. Wasmann Jour. Biol. 10: 330 (3 ♀♀, 1 ♂; Kill Devil Hills, N. C.).—Krombein, 1953. Proc. Ent. Soc. Wash. 55: 132 (2 ♀♀; Kill Devil Hills, N. C.).

Tachysphex sp. No. 4, Krombein and Evans, 1955. Proc. Ent. Soc. Wash. 57: 231 (2 ♂♂; Arcadia, Fla.).

Holotype. ♀; Kill Devil Hills, Dare Co., NORTH CAROLINA; June 26, 1954 (K. V. Krombein) [U. S. National Museum, Type No. 66665].

Female. Length 7 mm, forewing 5 mm. Black, the following light red—entire abdomen, basal two-thirds of mandible, apical half of tegula, and hind femur and tibia; wing clear, the veins testaceous. Vestiture moderately dense, silvery and appressed on face below ocelli, thorax, legs, and across apices of first four abdominal terga, that on scutum with a slight golden cast.

Clypeus with small dense punctures on basal part, the apical bevel polished and with a few, scattered large punctures, the lip broadly and shallowly arched and with a small lateral notch; front with punctures a little larger and more separated than on base of clypeus; ratio of lengths of first three flagellar segments, least interocular distance, and clypeal breadth as 9:11:11:16:42.

Scutum shining, with small subcontiguous punctures; scutellum shining, the punctures a little larger and slightly more

separated; mesopleuron dull, with very fine close punctures; propodeum moderately granulose above, laterally with fine, close oblique rugulae.

Tarsal comb with individual bristles about three-fourths as long as basitarsus.

First four abdominal terga subshining, with delicate, close punctation; pygidium glossy, with a few, scattered small punctures, the apical angle about 30° .

Allotype. ♂; same data as type, but July 2, 1954 (K. V. Krombein) [USNM].

Male. Length 5 mm, forewing 3.5 mm. Colored as in female except hind femur and tibia, apex of third abdominal tergum, and fourth to seventh abdominal segments black, the tarsi somewhat reddened. Vestiture rather abraded, apparently quite similar to that of female, except fifth abdominal tergum also with an apical silvery band.

Clypeal bevel more punctate than in female, the lip poorly developed, and apical margin of median lobe narrower, more strongly rounded and without lateral notch; ratio of lengths of first three flagellar segments, least interocular distance, and clypeal breadth as 6:7:7:15:30.

Tarsal comb abraded (in some paratypes the bristles a little longer than apical width of basitarsus).

Genitalia: Setae of volsella and gonostyle moderately long, in a single row, those of volsella more numerous and minutely capitate; serrated crest of volsella with margin evenly rounded above, abrupt posteriorly; aedeagal teeth moderately large, closely grouped, 4 in number.

Paratypes. 15 ♀♀, 1 ♂; Kill Devil Hills, Dare Co., N. C.; May 24, 1952 (♀), June 23, 1954 (♀), June 26, 1950 (♂), June 27, 1954 (♀), June 28, 1954 (3 ♀♀), June 30, 1954 (3 ♀♀), July 1, 1954 (3 ♀♀), July 2, 1954 (3 ♀♀) (K. V. Krombein) [KVK]. 3 ♀♀; same locality, but July 22, 23, 26, 1962 (F. E. Kurczewski) [FEK]. 1 ♀; Salvo, Dare Co., N. C.; August 6, 1958 (K. V. Krombein) [KVK]. 1 ♀, 1 ♂; Arcadia, DeSoto Co., Fla.; March 31, 1954 (♂) and July 2, 1962 (♀) (K. V. Krombein) [KVK, USNM]. 6 ♀♀, 1 ♂; Arcadia, Fla.; March 27,

1957 (♀), March 30–April 1, 1954 (♂), April 27, 1955 (5 ♀♀) (H. E. and M. A. Evans; one of them labeled HEE 963) [CU]. 2 ♀♀; Arcadia, Fla.; June 30 and July 10, 1962 (F. E. Kurczewski) [FEK]. 2 ♀♀; Fort Pierce, St. Lucie Co., Fla.; July 16, 1962 (F. E. Kurczewski) [FEK]. 1 ♀, 1 ♂; Welaka, Putnam Co., Fla.; April 18–20 (♀) and May 1–4, 1955 (♂) (H. E. and M. A. Evans) [CU]. Paratypes have been placed in the collections of the U. S. National Museum, Academy of Natural Sciences of Philadelphia, Museum of Comparative Zoology, Cornell University, R. M. Bohart, F. E. Kurczewski, and the author. Female paratypes are 5.5 to 7.5 mm long and males range from 4.0 to 5.5 mm. The coloration is quite constant except that the third abdominal segment of the male may be entirely red or all black, and the hind legs of the female, especially of those from Florida, may be mostly or entirely dark.

Tachysphex tarsatus (Say) is the only other species in the southeastern United States in which the abdomen of the female may be entirely red. It is readily distinguished from *boharti* by being much larger, in lacking the relatively dense, appressed silvery vestiture, in having the mesopleuron granulose, and in the different ratio of length of flagellar segments and least interocular distance.

T. boharti is apparently restricted to sparsely vegetated sandy areas. Dates of capture in both North Carolina and Florida indicate definitely that there are two or more generations annually. I obtained a few notes on the biology at Kill Devil Hills 11 years ago. I observed a female (52452 A) on May 24, 1952, at 1331 hours, dragging a grasshopper nymph, slightly larger than herself, over the sandy barrens. Occasionally she made short leaps with her prey. After she had traveled a distance of about 3 meters, she came to her burrow entrance adjacent to a grass tuft and immediately pulled in her prey. I lost the wasp during my excavation of the nest, but captured her when she returned to the site a few minutes later. I also lost the course of the burrow in the loose sandy soil, but 5 cm below the surface I located a cell holding three grasshopper nymphs ranging from 6–7 mm in length. The nymphs were paralyzed, but exhibited

jerky reflex movements of the legs and palpi, and voided several fecal pellets during the following 24 hours. The wasp egg was attached transversely to the sternum of one of the nymphs between the fore coxae; the egg was injured during my excavation of the nest, for it shriveled up a day later. A. B. Gurney identified the prey as probably second- or third-instar nymphs of the acridid, *Psinidia fenestralis* (Serville).

H. E. Evans furnished a few biological notes on a female *boharti* (HEE 963). Inasmuch as they differ in several details from those I made, I quote them here with Dr. Evans' permission. "This wasp was seen at 3 P.M. on March 27th, 1957, on the sandflats along the Peace River at Arcadia, Florida. She was carrying a grasshopper over the ground, not flying, proceeding forward and grasping the hopper by the base of the antennae; the hopper was venter up. The hopper was larger than the wasp, so the wasp proceeded slowly and haltingly. She went one meter to her nest, the entrance to which was open. She put the hopper in the entrance, and pulled it in from the inside. In one and a half minutes she could be seen filling. The wasp was captured and the nest dug out. The egg was on the throat of the grasshopper; there was only one grasshopper in the cell. The burrow was 3 centimeters long, the cell only 1 centimeter beneath the surface of the sand. The larva did not develop to maturity because the grasshopper was consumed by mold a few days later. The grasshopper was a nymph of *Scirtetica marmorata picta* Scudder."

A Constant Pressure Respirometer for Small Arthropods

MANFRED D. ENGELMANN *

INTRODUCTION

There has been increasing awareness of the importance of the arthropod fauna to the natural community, and recent work on soil arthropods also follows this trend (Engelmann, 1961). Data on species diversity and numbers of individuals do not always reflect the true impact of populations upon the local area; information on energy consumption and metabolic rates is also needed, and is essential, moreover, to a complete understanding of the species' success or failure under natural conditions.

Respiration rate is a reflection of the total metabolic rate, and a respirometer, therefore, becomes an important tool to the investigator interested in the energetics of arthropod populations.

Of the three basic types of respirometer (Dixon, 1952), the constant pressure type is the simplest in theory, in operation, and in terms of the calculations required. Smith and Douglas (1949) developed such a respirometer for use on house flies that were to be subjected to various insecticides. This instrument proved to be very satisfactory except for the difficulty in obtaining tight seals between the glass manometers and brass chambers. The simplicity of the basic design, however, lends itself to modification, and the result is a new form of the constant pressure respirometer, described in this paper. I used this respirometer on mites and other small arthropods to gain information on their total respiration rates under controlled conditions.

DESCRIPTION OF APPARATUS

The new respirometer consists of a vessel for the experimental material, and a manometer. Also required are a waterbath, scale for the manometer, chemicals for the reaction, compression tubing, and vacuum jug. Since I was dealing with intact animals rather than tissues, no oscillating apparatus was needed.

* Dept. of Natural Science, Michigan State University, East Lansing.

The vessel of this respirometer is constructed from a $\frac{5}{12}$ glass (pyrex) outside joint. This is a standard item, available from suppliers of chemical glassware. A piece of pyrex tubing (20 mm $\times$ 5 mm) is fused to the end of the joint, and the distal end of this tube is sealed. Two glass hooks are fused to the vessel near the end of the joint (see Fig. 1). The total length of the vessel is about four cm.

The manometer is constructed from thick-walled pyrex capillary tubing having dimensions as follows: outside diameter, 5 mm; diameter of capillary bore, .5 mm; total length of manometer, 200 mm. One end of the tubing is ground to a standard taper (4° angle) to fit snugly into the joint. Glass hooks are fused to the manometer at the base of the taper.

The readings from the manometers are made against a measured scale. Ideally the scale should be scribed directly on the manometer, but an alternative method is to place the manometers upon a ruled background. Such a ruled scale can be made from millimeter paper glued to glass or plexiglass and water-proofed with one of a number of commercial compounds.

A drop of liquid introduced into the manometer is used as an index point during the experiment. Manometer fluids can be of several types. Cunningham and Kirk (1940) used kerosene, treated to remove the resinous materials. The treatment consisted of placing the kerosene in concentrated sulfuric acid for several days, removing the acid and storing the kerosene in a stoppered bottle over pellets of sodium hydroxide. Kerosene has the advantages of having low viscosity and oxygen affinity. Distilled water containing a dye and a small amount of detergent makes another satisfactory manometer fluid.

The temperature of the apparatus must be kept constant during the course of the experiment. If the experiment is of short duration, a simple box (*e.g.*, a refrigerator crisper with cover) provides sufficient insulation to prevent temperature fluctuations. If experiments are to last more than an hour some form of temperature control is recommended. If higher temperatures are to be maintained, a circulating water bath with thermostat and heater is effective. Lower temperatures can be

obtained by placing the waterbath in a refrigerator or by means of a cooling coil connected to the local water supply. In Michigan for example, during the coldest months, temperatures as low as 10° C. can be maintained.

In this respirometer the carbon dioxide given off by the organism is absorbed by a 3% NaOH solution on strips of filter paper in the vessels. There is consequent reduction in the total volume of gas in the vessel with a corresponding decrease in the pressure which is reflected by the movement of the index droplet in the manometer.

Calibration of the Manometers. A constant pressure respirometer does not require use of vessel constants (see Dixon, p. 6). The amount of oxygen used by the organisms during the experiment is directly related to the distance travelled by the index droplet; therefore, it is necessary to determine only the volume of the capillary bore over a measured distance of the tubing. The determination can be accomplished by two simple methods: 1) The weight method consists of weighing the dry manometers before and after filling them with mercury of a known temperature. See the table "Density and Volume of Mercury" (p. 1722, *Handbook of Chemistry and Physics*, 1949) for conversion of weight of mercury into volume. 2) A microscope with ocular micrometer is used in direct measurement calibration. The bore of the manometer is measured at both ends of the tube, then the tube is submerged in water and the bore is checked for uniformity. Volumes are calculated using the formula for the volume of a cylinder.

Assembling the Respirometer for Operation. The procedure for putting the instrument into operation is as follows: first, strips of filter paper, 14×12 mm are rolled into hollow cylinders and inserted into the distal ends of clean, dry respirometer vessels. The filter paper is then moistened with water. The arthropods are placed in the moist filter paper cylinder which is then closed at the top by a small plug of sterile cotton. Another coiled strip of filter paper, 30×3 mm is soaked in 3% NaOH solution, the excess is blotted from the coil, and the coil is inserted into the front section of the vessel. The manometer is

greased and inserted into the vessel joint. Rubber bands are used to hold the manometers and vessels together. A drop of manometer fluid is sucked into the capillary tubing by first warming the vessel in the hands, then dipping the open end of the manometer into the manometer fluid and allowing the vessel to cool. Thermobarometers (vessels which contain no animals) record any changes caused by variation in temperature or barometric pressure. The vessels and manometers are secured to the millimeter scale with rubber bands. The open end of each manometer is inserted into a length of tygon tubing. All of the tubing is attached to a single $\frac{1}{4}$ liter bottle via a branching system of "T" tubes. The closed system thus created has all of the advantages of the Barcroft respirometer (see Dixon p. 24), however, since the compensating vessel is a thousand times greater than the volume of the manometers, the Barcroft vessel constant is not necessary. The system continues to perform as a constant pressure respirometer. A barometer reading is taken. The entire system is placed in the water bath and allowed to equilibrate (15 minutes), then the position of the index droplet is recorded. At the end of the experiment the positions of the index droplets are recorded once more, and the respirometers are removed and taken apart. The animals are killed, desiccated, and weighed. The respiration is calculated by the following formula from Smith and Douglas (1949) :

$$\begin{aligned} & (\text{cm respiratory change} - \text{cm thermobarometer change}) \\ & \times \text{volume factor} = \text{oxygen consumption.} \end{aligned}$$

The volume of oxygen consumed is reported at standard pressure and temperature.

Variations Possible in the Construction of This Respirometer. Manometers can be made with various bores (e.g., from 1 ml pipettes to .25 mm capillary tubing). Vessel size can also be altered. Joints of various diameters can be employed to create a vessel large enough to accommodate a grasshopper. If the ends of the capillary tubing cannot be ground to the proper angles, the capillary tubing can be fused to a commercial inner joint to make the manometer. The end of the manometer may be

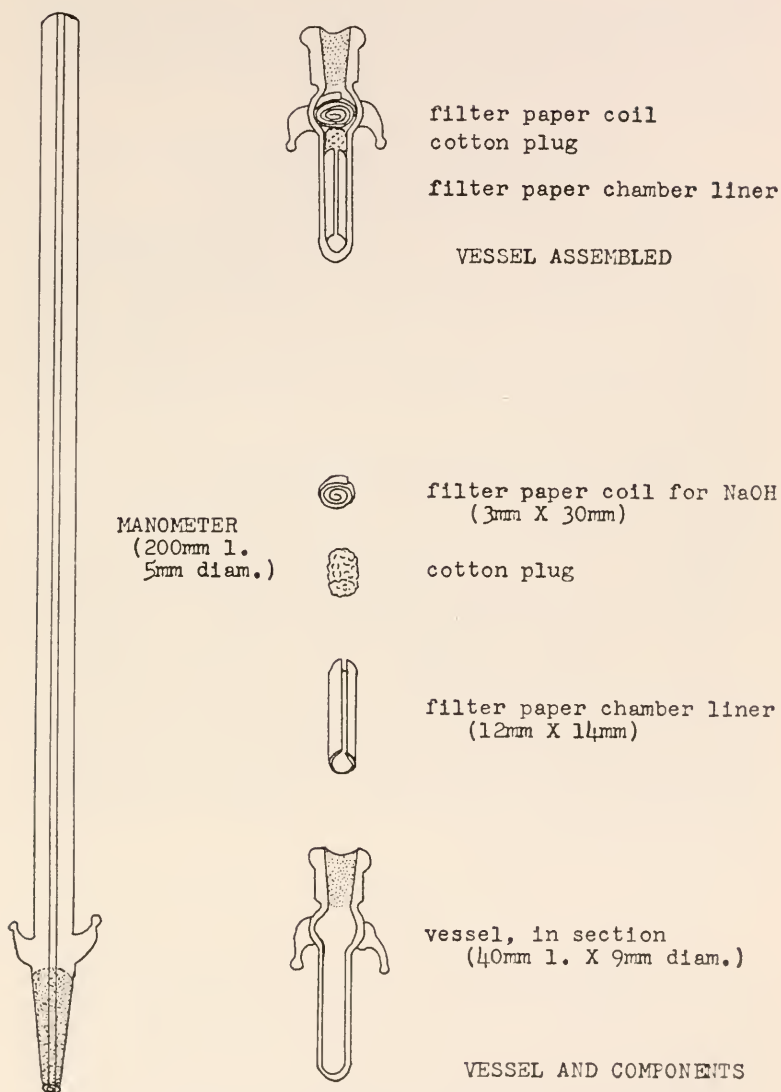


FIG. 1. Diagram of the manometer, vessel, and components of the constant pressure respirometer.

bent at right angles so that the vessel can be submerged while the manometer remains out of the waterbath. Many other innovations can be employed to adapt this system to a particular purpose.

COMPARATIVE DATA FROM WARBURG AND
CONSTANT PRESSURE RESPIROMETER

Respiration experiments were conducted on the oribatid mite, *Scherloribates laevigatus* in both the constant pressure respirometer and the Warburg respirometer. The data given in TABLE 1 indicate that the two respirometers produce comparable results. The dry weight of the animals in the vessels averaged 2.0 micrograms per individual or totaled from 22 to 54 micrograms. Consistent data were obtained on 54 micrograms of mites after 18

TABLE 1. Respiration of *Scherloribates laevigatus* measured by two different respirometers

No. indiv. used	Temp.	Respirometer	Duration of experiment in hours	ml/ind/hr
11	24° C.	Constant pressure	68.5	.0041
27	25° C.	Constant pressure	18.0	.0041
24	25° C.	Warburg	41.0	.005

hours in the constant pressure respirometer while twice as much time was required to obtain similar results with a comparable amount of material in the Warburg. It may be concluded from these data that the constant pressure respirometer is more sensitive than is the Warburg.

SUMMARY

The constant pressure instrument described in this paper has the advantages of being simple in both construction and operation. By varying the dimensions of the vessels and capillary tubing, the instrument can be made to accommodate animals from the size of a grasshopper down to an animal as small as an oribatid mite. Data from a limited study show that the respirometer compares well with the Warburg. The constant pressure respirometer is a useful tool where total respirations are needed.

Two New Genera and a New Species of Bembicini
(Sphecidae) from North America, with a
Key to the Genera having Recessed
Ocelli

JAMES E. GILLASPY,* Museum of Comparative Zoology,
Cambridge, Massachusetts

In 1959 (p. 193) I indicated the existence of six groupings of species under the genus *Stictiella*, and mentioned that at least some were probably of generic rank. Later (1962, p. 563) the name *Stictiella* was restricted to two of these groups and four groups were segregated in a new genus, *Glenostictia*. In a revisionary work now being completed it has become desirable to refer to certain major patterns of differentiation among the bembicines in delineating probable origins and ancestral characteristics of the genus *Steniolia*. Two of the groups now under *Glenostictia* have been continually confirmed as of generic status since 1959. One of these is based upon an undescribed species and the other upon species that have been relatively poorly known, and both groups, in particularly the former, present characteristics of special importance to the understanding of *Steniolia*. Accordingly it appears opportune at this time to formulate their characteristics and present generic and species descriptions, thus facilitating reference to them and establishing them on an equitable basis with other higher categories of bembicines.

Xerostictia longilabris longilabris, new genus, new subspecies.
FIGS. 1-7.

Holotype.—♀, ARIZONA: PIMA Co. 12 miles SSW Ajo, fls. *Lycium*, 26.VII.61 (J. E. GillaspY) [MCZ No. 30652].

Description of type female.—Length 16 mm. Erect and recumbent vestiture both very weakly developed, giving a bare

* This investigation was supported by a National Science Foundation grant (NSF-G17497) for study of the evolution of structure and behavior of nyssonine digger wasps.

appearance; no thickened silvery-appressed hairs forming reflective surfaces. Sculpture mostly fine and dense, coarser on most dorsal surfaces, coarsest medially on metasomal tergite 6 as a faintly indicated pygidial area, without definite carinae. Color pattern intense black with very extensive, almost entirely light yellow maculation but distal four segments of antenna reddish-brown beneath and small areas of clear cuticle without underlying pigmented epidermis present on pronotum and elsewhere, especially free margins of sclerites, which may appear black if overlying another layer of integument which is black. Maculate areas: mandible base before preapical tooth; labrum; clypeus; face except tentorial area, narrow extension downward of black along lateral ocellar-frontal furrow almost to frontal pit and narrow area about anterior ocellar lunule; very broad posterior orbits, extending into occipital area medially and ventrally, at no place narrower than widest diameter of scape; scape except dorsal-apical spot; remainder of antenna ventrally; pronotum entirely except minor sutural black behind neck; mesoscutum more than half, as longitudinal notaular and lateral stripes, former narrowly incomplete anteriorly, separate from one another postero-medially, broader than black parapsidal lines beside them, at least at broadest point; scutellum predominantly, except antero-median black which with that of mesoscutum forms sidewise theta-like figure incorporating parapsidal sutures in its lateral periphery, median mesoscutal sutures in its diametric stripe, and posterior border which is largely clear but has some black, not as continuous band turning forward into axillary fossa laterally; metanotum except anterior black which scarcely exceeds overlying scutellar margin; tegulae anteriorly, clear posteriorly; remainder of mesosoma almost entirely, with very little black other than small spot behind pronotal lobe, at pleural arm pit, epimeral pit, thin sutural black along mesopleural and metapleural sutures, in former interrupted above pleural arm pit, narrow antero-median crescent restricted to basal half of basal area, and thin extra-triangle V, apically bisected to posterior propodeal pit and including post-spiracular serifs on propodeum; coxae and trochanters almost totally;

femora except narrow longitudinal postero-dorsal line, progressively reduced from first to more posterior femora, vestigial on metafemora; tibiae and tarsi (except claws and arolia) entirely; tergite 1 except anterior face between spiracles, two discal spots, fused to each other, and thin posterior border ending laterally before point of intersection of extrapolation of subspiracular suture; tergite 2 except small basal-lateral spots, transverse, barlike gradular spots and narrow posterior margin; tergites 3-5 similar to tergite 2 except gradular spots adnate to basal black, posterior marginal black progressively reduced, absent on 5; tergite 6 except lobate basal black on either side, without median wedge; sternite 1 except very small lateral spot of either side; sternite 2 except thin antecostal margin; sternites 3-5 except narrow antero-median lobe, increasing on more posterior sternites; sternite 6 except narrow basal band, which is angulately produced medially and on each side.

Structural characters of female. Head: Slightly wider than mesosoma at pronotal lobes ($1.04 \times$); labial palpus 2-segmented, maxillary palpus 4-segmented; maxilla (measured from base of palpus) $1.4 \times$ height of compound eye; labrum $1.9 \times$ longer than basal width, narrowed at beginning of apical third, surface simply conic, not swollen, pyriform; clypeus $1.7 \times$ wider than median length, moderately protuberant as viewed in lateral aspect, surface evenly rounded, finely and uniformly punctate except along antero-median border, vestiture extremely fine and inconspicuous, clypeus appearing bare; dorsal margin of clypeus attaining but not exceeding lower level of antennal sockets; sockets widely spaced, intersocketal distance one and one-fourth times socket-eye distance; front narrow, moderately and almost uniformly divergent above and below, narrowest point slightly above antennal sockets, this slightly more than one-third of total head width ($1.0:2.8$) and exceeded about one-tenth by distance of eyes apart at vertex ($1.1:1.0$); sutural arch of lunule or lens of anterior ocellus slightly longer than wide ($1.1:1.0$) but floor of ocellar pit distinctly longer than wide ($1.4:1.0$) vertically between dentlike depression above and another below lunule; crest of mounded surface also describing vertically

elongate figure (1.4:1.0); vertex slightly depressed beside lateral ocelli, but interocellar mound extending slightly above eyes; occipital carina weak behind vertex but not deviating from evenly arcuate course. *Antennae*: Scape slender (3.1:1.0), first five segments 61:13:54:35:30. *Legs*: Arolium distinct, moderately developed, about one-third claw length or less. *Wings*: Length distad of humeral plate $2.27 \times$ width of mesosoma at pronotal lobes.

Allotype.—♂, same data as holotype. [MCZ No. 30652].

Description of allotype male.—Length 14 mm. Vestiture and black markings developed more strongly than in female, maculation of similar hue to that of female, but with significant differences in black-maculate pattern. Head: Posterior orbits narrowed, at narrowest less than half of widest scape diameter. Mesosoma: Black spot on pronotum behind neck which does not extend posteriorly as far as halfway to prescutal margin of pronotum; maculate notaular stripes narrower than black parapsidal stripes laterad of them, extending from near anterior margin of scutum (as close as distance between median scutal lines) to posterior margin of scutum, where they end in clear integument which appears black because of underlying black-pigmented integument; notaular stripes distinctly separated medially near posterior scutal margin by black which traverses marginal area, which is clear to either side of the black; scutellum traversed by a complete maculate fascia, posterior margin broadly clear except median and bilateral black spots; metanotum with basal black conspicuous, but not extending posteriorly to middle of sclerite; propodeum with black basal crescent not extending postero-medially to margin of basal area, triangle thus broadly lined with yellow except notchlike apical black around posterior propodeal pit; lower mesepimeron broadly yellow but bordered by sutural black especially above; mesepisternal-mesosternal plate broadly yellow, but small spot of black present behind pronotal lobe, on mesosternum anteriorly, and before mesocoxa. Legs: Yellow except minor black of coxae and trochanters, narrow lines above on femora, and dusky spot above on distitarsi. Metasoma with discal black spots of

tergite 1 broadly fused and joined to basal black; remainder of mesosomal markings approximately as in female, except for some extension of black markings.

Structural characters of male. Antennae: Segments from 3 outwardly exhibiting progressive modification from simple cylindrical; segment 4 with narrow tyloidal carina, recognizable also on succeeding segments, where there is development of a transversely flattened area dorsad of it, this becoming longitudinally bowed and glabrous on segment 8 and following segments; segment 4 faintly emarginate apically on tyloidal side, this more pronounced on following segments except segment 13. Legs: Femur 2 serrate-carinate from near base to apex, with almost even gradation to longer teeth apically, serrations traversing medial aspect of femur in basal half, in apical half deviating slightly to posterior then curving back and ending in tooth slightly anterior of middle; tibia slender, exteriorly flattened, longer than femur, apical calcar brownish, thickened, bluntly pointed; basitarsus inwardly emarginate, set with two long bristles at base, one bristle at apex of emarginated area. Metasoma: Sternite 2 with low median carina, developed most strongly somewhat before apical margin of sclerite; sternite 6 faintly emarginate apically, otherwise normal; tergite 7 with basal glabrous band above spiracular lobes, width of band uniform, not definitely angulated postero-medially, extending almost one-third length of segment; spiracular lobes short, truncated slightly beyond spiracle, surface almost entirely glabrous; inner rim of tergite 7 above spiracular lobe developed into a broad thin flange anteriorly, this lying inward to sternite 7 and the spiracular lobe, respectively; sternite 8 with slender ventral process; genitalic cuspis equal to digitus.

Paratypes.—ARIZONA: PIMA Co. Ajo, ♀, fls. *Bebbia juncea*, 27.VII.61 (J. E. Gillaspay). Ajo, 12 miles SSW, 1 ♂, 1 ♀, fls. *Lycium*, 26.VII.61; 2 ♂, 11 ♀, fls. *Lycium*, 27.VII.61 (J. E. Gillaspay). Childs, 2 ♂, 1 ♀, fls. *Compositae*, 26.VII.61 (J. E. Gillaspay). Sells, 9 miles W of, ♀, 7.VIII.55 (G. D. Butler and F. G. Werner, University of Arizona). YUMA Co. Roll, ♂, alfalfa, 6.VIII.54 (G. D. Butler, University of Arizona). CALIFORNIA: RIVERSIDE Co. Palms to Pines Highway, San Jacinto

Mts., 3200 ft, ♂, on *Larrea divaricata*, 27.VII.50 (P. H. Timberlake, University of California at Riverside). SAN DIEGO Co. Borrego Vly., ♂, 29.VIII.58 (E. I. Schlinger, University of California at Riverside).

Variation of paratypes.—Females range in length from 15 to 18 mm, males from 13 to 17 mm. Color pattern of the female exhibits minor variation, as exemplified by three specimens having maculate stripes between the median mesoscutal lines, while on the metasoma tergite 1 may have the discal spots completely fused or completely separate and tergite 2 may have the discal (gradular) spots basally adnate at one extreme or completely absent at the other, and one specimen has discal spots of tergites 1–6 all attached to basal black. In the male the notaular macula is slightly wider at its widest than the parapsidal black stripe beside it in all specimens except the type.

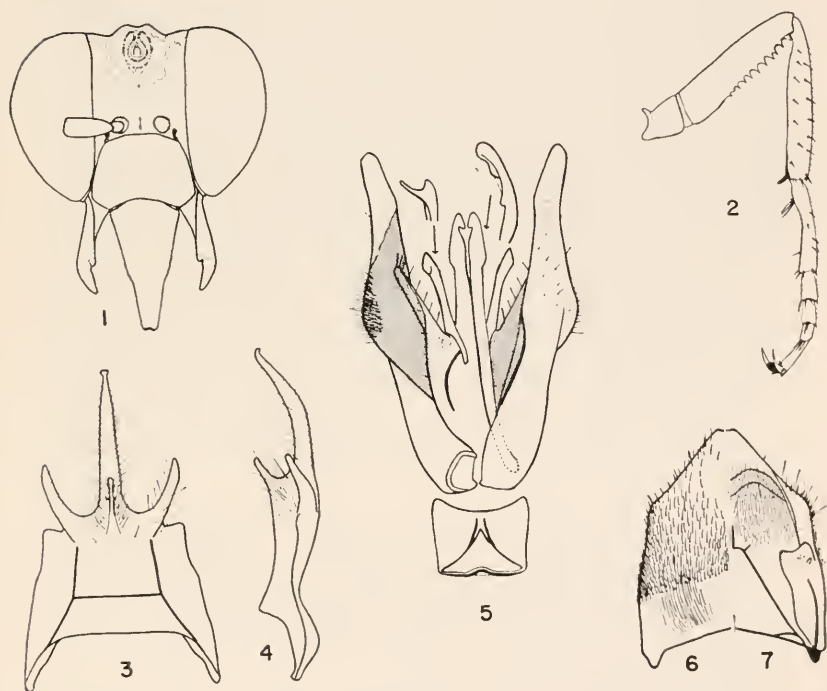
***Xerostictia longilabris boharti*, new subspecies**

Holotype.—♀, MEXICO: BAJA CALIFORNIA. San Pedro, 7.X.41 (Ross and Bohart, California Academy of Sciences) [CAS].

Description of holotype female.—Length 14 mm. Pattern consists of essentially the same black and maculate markings as in the typical subspecies, but the black is much more extensive at each site. Specific differences from the type of *longilabris* include: Head: Posterior orbits at narrowest much less than scape diameter. Mesosoma: Rectangular black area on pronotum extending approximately half-way from neck to posterior margin of pronotum; notaular maculate stripes much narrower than black parapsidal stripes beside them; scutellum with black posterior border which turns forward into axillar fossa laterally; metanotum with anterior black extending posteriorly almost to middle of sclerite on the midline; black in basal area of propodeum attaining posterior declivity marking boundary of basal area; mesopleural suture entirely traced with black. Metasoma: Tergite 1 with median black lobe from basal black extending over area where discal spots are located in the typical form, and this lobe narrowly attached distally, interrupting maculate fascia; tergites 2–6 with discal spots broadly attached to basal black.

Allotype.—♂. MEXICO: BAJA CALIFORNIA. Pescadero, 8.X.41 (Ross & Bohart, California Academy of Sciences) [CAS].

Description of allotype male.—Length 15 mm. Pattern basically that of typical subspecies but black markings extended. Head: Posterior orbital maculae thin, ending before posterior angles of compound eyes. Mesosoma: Large somewhat quadrangular black spot behind neck, extending anteriorly across collar on either side and posteriorly to near prescutal margin, separated by distance about equal to distance between median scutal lines; notaular maculae less than two times longer than



FIGS. 1-7. *Xerostictia longilabris longilabris*: 1—head, female; 2—middle leg, male, anterior; 3—8th sternite, male, ventral; 4—8th sternite, male, lateral; 5—genitalia, male, ventral and dorsal; 6—7th tergite, male, dorsal; 7—7th tergite, male, ventral. Membranous areas stippled.

distance between median scutal lines; lateral maculae extending little beyond tegulae anteriorly; scutellum with maculation divided into a low triangle on either side, posterior margin broadly black and this turning anteriorly into axillary fossa on either side; metanotal black extending posteriorly beyond middle of sclerite; propodeum extensively black above, leaving only linear maculae along sides of triangle, confined to basal area; sides of propodeum with rather extensive maculation, one large area including postero-lateral angles and most of sides and a separate smaller area on and anterior to spiracular shield; lower plate of mesepimeron black, and this extending ventrally along posterior mesepisternal-mesosternal plate to beyond signum although not to midline, and anteriorly to signum and beyond signum on either side; black spot on anterior mesosternum and behind pronotal lobe well developed, leaving maculate band from mesopleural suture (upper epimeral plate) to midline and posteriorly to end of mesosternum; maculation of metapleural plates joined. Legs: Conspicuous black on coxae and trochanters, that of latter matching femoral stripe, which is broad and extends to near apex of femur on all legs; tibiae and tarsi entirely maculate except slight duskiness above on distitarsi. Mesasoma: Tergite 1 with extensive basal and apical black broadly joined medially, interrupting maculate fascia, discal spots inevident in sessile lobe from basal black; remaining tergites with discal black spots broadly joined with basal black and black of apical margin well developed, but all maculate fasciae complete.

Paratypes.—MEXICO: BAJA CALIFORNIA. La Paz, 6 miles W, ♀, swept *Wislizenia*, 3.IX.59 (K. W. Radford and F. G. Werner, California Academy of Sciences); Mesquital, 20 miles N, ♀, 27.IX.41 (Ross and Bohart, California Academy of Sciences); San Ignacio, 15 miles N, ♀, 29.IX.41 (Ross and Bohart, California Academy of Sciences).

Variation of paratype females.—Length 15–17 mm. Triangular maculae of scutellum joined in one specimen, and maculate fascia of metasomal tergite 1 complete in the paratypes.

This subspecies is dedicated to Dr. George E. Bohart of the United States Department of Agriculture Bee Culture Laboratory, Logan, Utah.

Discussion.—The female specimens of *boharti* are quite constant in pattern, despite their widespread origins in Baja California. They may be conveniently distinguished from the typical form by having notaular maculae narrower than the parapsidal black stripes lateral to them, rather than broader; anterior black of metanotum extending well onto the discal portion of the sclerite, beyond the projecting scutellar margin, rather than exceeding the margin little if at all; posterior marginal black of the scutellium extending anteriorly into the axillary fossa rather than being definitely limited to the marginal area; and metasomal tergites without any free black discal spots, rather than usually with at least some free, or absent. The male of *boharti* is separable by its thin posterior orbital maculae, which end before the posterior angles of the eyes, rather than extending onto the vertex; extensive pronotal black, separated from the prescutal margin of the pronotum by about the interval between the median scutal lines, rather than being limited to the anterior half of the sclerite; short notaular maculae, not more than two times the scutal line interval in length, rather than ten times this value, or nearly so; black of posterior scutellar margin extending anteriorly into the axillary fossa; and reduction of maculation in the propodeal triangle to separate lateral lines confined to the basal area, rather than continuous across and largely filling the triangle, including the portion on the posterior face of the propodeum. There appear to be no pronounced structural differences between the two subspecies in either sex.

Xerostictia differs from all genera that are considered to be closely allied in its palpal formula (2 and 4 labial and maxillary segments, respectively), the degree of elongation of the labrum, which is about two times longer than its basal width, and the short spiracular lobes of the male 7th metasomal tergite, which are of unique form, truncated shortly beyond the spiracle. Among characters relating it to *Stictiella* are the serrate femur and other features of the middle leg of the male, the only slightly

depressed vertex, the slender distitarsi, and the protuberant clypeus. The moderate degree to which the arolium is developed may also indicate affinity with *Stictiella*. Indications of affinity to *Steniolia* are the slightly elongate anterior ocellar lunule and elongation of the mound associated with it; the rather long first flagellar segment; and elongation of the proboscis approaching that of *Steniolia*, associated with reduction in number of palpal segments; and male characters, including tendency toward a single rather than double process of sternite 2 represented by the low median carina, presence of a ventral spine on sternite 8, and the elongate genital cuspis.

MICROSTICTIA, new genus

Monedula: Handlirsch, 1890 (part); Fox, 1895 (part); Smith, 1908, Nebr. Univ. Stud. 8: 60-62 (part); Cresson, 1928, Mem. Amer. Ent. Soc. 5: 46.

Stictia: Michel, 1916, Trans. Amer. Ent. Soc. 42: 418-420 (part).

Stictiella: Parker, 1917, 1929 (part); Mickel, 1917, Can. Ent. 49: 285-286 (part); Mickel, 1918 (1917), Nebr. Univ. Stud. 17: 117-119 (part); Gillasp, 1959 (part).

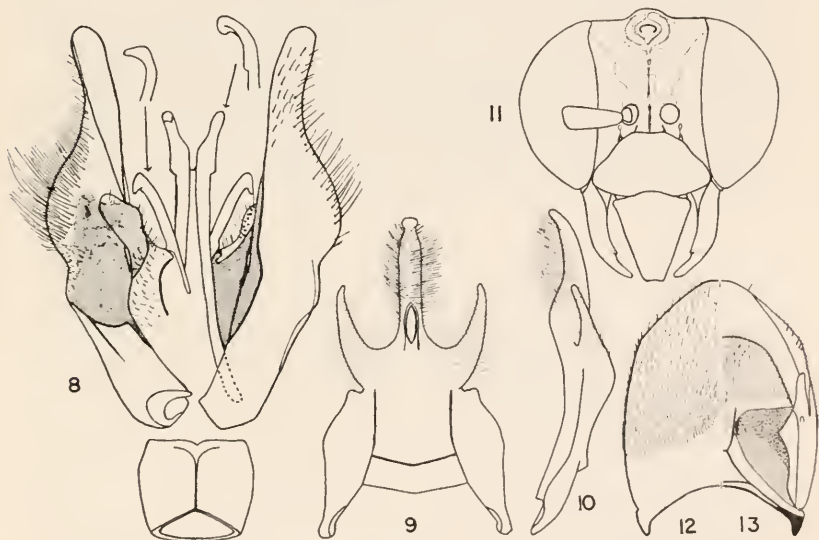
Glenostictia: Gillasp, 1962 (part).

Type.—*Monedula femorata* Fox, 1895: 368 (Jacksonville, Florida) (= *Stictiella femorata*: Parker, 1917: 53; 1929: 46; = *Glenostictia femorata*: Gillasp, 1962).

Description of genus.—Size small, length not exceeding 13 mm. Head: Labial and maxillary palpi normal, with 4 and 6 segments, respectively; proboscis less than $1.5 \times$ vertical eye length; labrum less than $1.5 \times$ longer than basal width, surface simply conic, not pyriform; clypeus truncated above, ending well below lower level of antennal sockets; anterior ocellus with circumocellar suture well-defined above the lunule, evenly arcuate and forming an arch which is about $2 \times$ wider than high, light-pervious surface beneath the arch fairly well defined and narrowly crescent-shaped but without a distinct sutural boundary below, where it slopes into a broad, dentlike depression; no distinct depression above the lunule; vertex not depressed below upper level of compound eyes either side of lateral ocelli, and

interocellar mound rising distinctly above eyes; occipital carina somewhat weakened behind vertex but its course smoothly arcuate, undeviating. Antennae: Flagellar segments short, with variation in length moderate, first flagellar segment about one-third longer than second; male with tyloidal carina on flagellar segments 2-11. Legs: Arolium distinct, moderate in development; male with femur 2 emarginate or entire, tibial calcar slender, light in color, and basitarsus variable but not emarginate and set with bristles. Metasoma (male): Sternite 2 with 2 (or 1 bifurcate) ventral processes; tergite 7 with short, narrow spiracular lobes and basal glabrous band over most of basal third of segment, this band angulately produced posteriorly on the midline; sternite 7 with an enclosure formed by posteriorly convergent apodemes; sternite 8 with a ventral process.

Discussion.—Three previously used names other than *femorata* apply to wasps which fall under this genus. These are



FIGS. 8-13. *Microstictia femorata*: 8—genitalia, male, ventral and dorsal; 9—8th sternite, male, ventral; 10—8th sternite, male, lateral; 11—head, female; 12—7th tergite, male, dorsal; 13—7th tergite, male, ventral. Membranous areas stippled.

Monedula minutula Handlirsch, 1890: 148 (Texas); *Monedula exigua* Fox, 1895: 370 (Montana); and *Stictiella divergens* Parker, 1917: 55 (Kansas). The three Arizona specimens which Parker assigned to *Stictiella exigua* served as primary basis for his concept of the species and represent a taxon apart from that of Fox. *Glenostictia gilva* Gillaspay is proposed as a new name for this entity, which is closely related to but apparently specifically distinct from *Glenostictia pulla* (Handlirsch). One of the two males Parker listed is from Congress Junction, Arizona (July, F. H. Snow, in University of Kansas collection) and this specimen is designated as holotype.

The two new genera presently described and three preexisting genera comprise a major bembicine taxon which is almost completely limited to the North American continent. Features which make clear the close relationship of these genera are largely associated with the ocelli, in particular the anterior ocellus, although all ocelli are recessed below the surface of the surrounding integument in a characteristic manner. The anterior ocellus, besides being located on the floor of a distinct depression, has a shallow dent or depression immediately anterior to the lunule or modified lens, and the surface about the ocellus is mounded, rising well above the surface of the lunule. The following key will enable separation of the genera concerned.

KEY TO GENERA

1. Labrum less than $1.4 \times$ longer than basal width and surface of simple conic form; labial palpus with 4 segments, maxillary palpus with 6 segments; proboscis less than $1.5 \times$ vertical eye length; sutural arch above anterior ocellar lunule at least slightly widened. 2
- Labrum either longer than $1.4 \times$ basal width or surface pyriform, swollen at base; palpal segments fewer than above; proboscis usually $1.5 \times$ vertical eye length or more. 4
2. Sutural arch above anterior ocellus distinctly broadened, more than $1.5 \times$ wider than long; arolium distinct; male mesofemur entire or broadly emarginate; clypeus scarcely protuberant or not protuberant; length not over 13 mm **Microstictia**
- Anterior ocellar arch distinctly less than $1.5 \times$ broader than long, often elongate. 3

3. Anterior ocellar arch slightly broader than long; arolium indistinct or small; male mesofemur serrate-carinate; clypeus rounded, protuberant; most species averaging over 13 mm in length.....**Stictiella**
 Anterior ocellar arch equidimensional or elongate; male mesofemur entire or notched near apex; arolium distinct; clypeus rather flattened, receding anteriorly; most species averaging over 13 mm in length.....**Glenostictia**
4. Labrum about $2 \times$ longer than basal width and surface of simple conic form; labial palpus with 2 segments, maxillary palpus with 4; proboscis about $1.5 \times$ longer than vertical eye length or slightly less.....**Xerostictia**
 Labrum less than $1.4 \times$ longer than basal width and pyriform, being swollen in basal half; labial palpus with 1 or 2 segments, maxillary palpus with 3 segments; proboscis more than $1.5 \times$ vertical eye length, usually distinctly so.....**Steniolia**

REFERENCES CITED

- FOX, W. J. 1895. Synopsis of the Bembicini of Boreal America. Proc. Acad. Nat. Sci. Phila. 351-374.
- GILLASPY, J. E. 1959. A new bembicine wasp related to *Stictiella tenuicornis* (Fox), with certain phylogenetic considerations (Hymenoptera: Sphecidae). Pan-Pacific Ent. 35: 187-94.
- GILLASPY, J. E., H. E. EVANS, and C. S. LIN. 1962. Observations on the behavior of digger wasps of the genus *Stictiella* (Hymenoptera: Sphecidae) with a partition of the genus. Ann. Ent. Soc. Amer. 55: 559-566.
- HANDLIRSCH, A. 1890. Monographie der mit *Nysson* und *Bembex* verwandten grabwespen. V. *Monedula*. Akad. Wien Sitzber. 99: 77-166, 1 pl.
- PARKER, J. B. 1917. A revision of the bembicine wasps of America north of Mexico. Proc. U. S. Nat. Mus. 52: 1-155.
- . 1929. A generic revision of the fossorial wasps of the tribes Stizini and Bembicini. Proc. U. S. Nat. Mus. 75: 1-230.

Range Extension of Colorado *Cyphoderris* (Orthoptera: Prophalangopsidae)

ROBERT B. WILLEY and RUTH L. WILLEY,¹ Ripon College,
Ripon, Wisconsin and Rocky Mountain Biological
Laboratory, Crested Butte, Colorado

The two known species of *Cyphoderris* are nocturnal katydids found only in the coniferous forests of northeastern North America. Zeuner (1939) and Ander (1939) have studied the morphology of this insect and have suggested that the genus is most closely related to the fossil Prophalangopsidae that were probably ancestral to the Gryllidae and Tettigoniidae. Since the only other living genus in this family (*Prophalangopsis*) is known from a single specimen from an uncertain locality ("India"), *Cyphoderris* holds an important place in evolutionary studies of the Orthoptera. Previously, the southernmost record in the Rocky Mountains was a single sample of three males (*C. monstrosa* Uhler) collected, August 17, 1932, in a pine forest in the Park Range, west of Cowdrey, Colorado, and about 10 miles south of the Wyoming border at an elevation of 8,800 ft (Hebard, 1934; Alexander, 1935, with correction of locality, 1941, p. 136). The present paper records the collection of five stridulating males of *C. monstrosa*² in an area extending one mile east and one mile west of Los Pinos Pass, Saguache County, over 10,000 ft in elevation in the San Juan Mountains on August 27 and 28, 1962. This record extends the range southward by about 200 miles. The insects were found after sunset in two types of forest; one was an open aspen-spruce community with a ground cover of several species of range grasses, *Chrysothamnus Parryi*, and *Rosa Woodsi*; the other was a more mature spruce-aspen forest with juniper, *Rosa Woodsi*, *Iris Missouri-*

¹ The authors wish to thank Professors Gordon Alexander (University of Colorado, Boulder) and Joseph Barrell (Beloit College, Wisconsin) for their aid during the study.

² Identification confirmed by Dr. Harold J. Grant, Jr., Academy of Natural Sciences, Philadelphia, Pennsylvania.

ensis, *Pachystima myrsinites*, and some sparse grass separated by considerable bare ground.

The males stridulated in diverse areas and positions. Usually the body was pointed head downward on whatever vegetation would support their weight. The observed singing stations included the trunk of a small aspen, a fallen branch, a spruce trunk about 9 inches in diameter, the top of the composite *Chrysothamnus*, and rose branches. One possibly dislodged male stridulated while walking on the ground. The distances of the stations from the ground varied from three inches to three feet. Observations of several of these males in captivity at the Rocky Mountain Biological Laboratory suggested that the optimum temperature for singing was about 10–15° C. The captive insects tended to move up and down their vertical singing stations with the changes in the temperature of the air layers. Although not all the insects observed were collected, diligent search during the day for hiding places near their singing perches revealed no sign of males, females, or nymphs. The fact that all specimens collected showed missing tarsi, tibiae or antennal segments with the wounds well healed indicated that they had been adult for some time. Since these insects were probably old survivors of a denser population, more reliable data on ecology and behavior will be sought earlier next season. It is probable that careful night collecting will reveal more populations in Colorado and possibly even in northern New Mexico.

LITERATURE CITED

- ALEXANDER, G. 1935. Orthoptera new to Colorado. Ent. News 46: 30.
———. 1941. Keys for the identification of Colorado Orthoptera. Univ. Colo. Studies 1: 129–164.
ANDER, K. 1939. Vergleichend-anatomische und phylogenetische Studien über die Ensifera (Saltatoria). Opusc. Entom., Suppl. II, vii + 306 pp.
HEBARD, M. 1934. Studies in Orthoptera which occur in North America north of the Mexican boundary. II. *Cyphoderris*, a genus of katydid of Southwestern Canada and the Northwestern United States. Trans. Amer. Ent. Soc. 59: 371–375.
ZEUNER, F. 1939. Fossil Orthoptera Ensifera. British Museum (Natural History), London, 321 pp.

A New Species of *Laphystia* Loew (Diptera: Asilidae)

FRANK MONTGOMERY HULL, University of Mississippi

A small, reddish species of *Laphystia* collected along an Arizona highway in August of 1959 is here described.

Laphystia sillersi, new species

A very pretty, small species with light, shining, brownish red abdomen, and small silvery polinose spots along the lateral portion of the posterior margin of all of the tergites. The first segment is shining black. Like *Laphystia martini* Wilcox, the first posterior cell is closed and stalked. Length 9 mm.

Male. *Head*: The head is black with pale, brownish yellow micropubescence on the vertex, front and face, changing to nearly white in character on the very short cheeks. The ocellarium is prominent with the anterior ocellus quite large; it bears about 10 erect, not very long, rather slender, whitish hairs but no distinct bristles. The occiput is dusted with greyish white pollen and moderately dense whitish pile below and weak yellowish white bristles on the middle and above. Pile of the face scanty, whitish and directed downward, becoming longer in front of the oral margin. The lower face has a rather compressed medial tuft of 6 or 8 yellowish white downward directed bristles; they are of no great length. The small, shining black proboscis is directed forward, not extending beyond the face. Antenna black, the first segment with 2 moderately stout, yellowish white bristles below.

Thorax: The thorax is black and shining, except for a large triangle of brownish golden pollen bordering the humerus medially and connected laterally with a marginal stripe of similar pollen along the sides of the mesonotum. This lateral stripe posteriorly becomes paler and more whitish and covers the postalar callosity and all of the disc of the scutellum. Only the posterior margin of the scutellum remains shining. While the

large triangles of pollen adjacent to the humeri are widely separated the intervening area on the deeply sloping anterior margin of the mesonotum is also pollinose. The notopleuron bears 1 pale yellow bristle; the supraalar region bears 2 similar bristles, one of which is shorter. The pile of the mesonotum is quite flat appressed, short and reddish golden and the scutellum bears similar pile. Except for the lateral band of pollen over the wing, the immediate area adjacent to this pollen is quite bare.

Legs: The legs are entirely black, the pile and bristles whitish.

Wings: The wings are tinged with pale brown. First posterior cell closed and stalked.

Abdomen: The first abdominal segment black, shining, except for a subtriangular lateral spot of silvery pollen. Remaining segments of abdomen both above and below light shining brownish red, of a more or less brick red color. Each tergite bears laterally on the posterior margin a spot of silvery pollen which viewed from the side appears to be elongate and viewed from above appears triangular. These spots are very widely separated. First segment with 2 short, stout, yellowish white bristles; second and third tergites with 3 similar bristles on each side, fourth and fifth tergites with one on each side. Male terminalia shining black with whitish pile.

Type: Male, collected on Highway 86, 14 miles west of Sells, ARIZONA, August 9, 1959. Two paratype males with the same data. Named for my son, aged 12, who collected the first male.

A Generous Legacy from Frank Morton Jones

THE AMERICAN ENTOMOLOGICAL SOCIETY was recently informed that it has received a bequest from the estate of the late Dr. Frank Morton Jones. Dr. Jones, a member of the Society for over 38 years, willed without restriction, a substantial share of his estate. This sum has been placed in the Society's endowment fund. By action of the Council, Dr. F. M. Jones was designated a Benefactor of the Society.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and Pyrgomorphinae of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) urgently required. Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus *Ceroglossus* wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus *Curculio* (formerly *Balaninus*) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address :

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 Race Street, Philadelphia 3, Pennsylvania

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and *Aedes aegypti* and *Culex quinquefasciata*

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

ENTOMOLOGICAL NEWS

OCTOBER 1963

Vol. LXXIV

No. 3

CONTENTS

Weber—Argentine myrmecology	205
Muchmore—Two European arachnids new to U. S.	208
Brown—A neotype for <i>Coenonympha ochracea</i> Edw.	211
Allen—Two new species of <i>Paratiphia</i>	219
Nomenclature Notice	224
Scott—Collembola of New Mexico, X	225
Review—Insects of Connecticut, Part VI	231

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.

AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

0-14-63

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: **H. W. ALLEN**, **H. J. GRANT, JR.**, **M. E. PHILLIPS**, **J. A. G. REHN**, and **S. S. ROBACK**.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder**, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXXIV

OCTOBER, 1963

No. 8

Argentine Myrmecology

NEAL A. WEBER, Swarthmore College, Swarthmore,
Pennsylvania

Argentina has been fortunate in the investigators who have dealt with its ant fauna. The great trio of Auguste Forel, Felix Santschi and William Morton Wheeler made full use of the cooperation of resident Argentine students of ants. In particular the widely distributed books by Forel and Wheeler took advantage of the generosity of Carlos Bruch in supplying excellent photographs and scientific data. To a lesser extent Carlo Emery identified Argentine material, such as from the noted collector Silvestri. Bruch and Dr. Angel Gallardo published scholarly works on the Argentine fauna in the 1910's to early 1930's, relying primarily on the able European myrmecologists for identifications.

No better photographs of ants and their nests exist than those published by Bruch. Of German origin, he had a background as a professional photographer before becoming a professor at the University of La Plata. He vacationed in the Cordoba Hills where he learned much about the rich fauna there and also had correspondents in other parts of the country who sent him specimens. Felix Santschi identified most of his specimens and, despite his tendency to describe minor variations, Santschi was well acquainted with the neotropical fauna so that the species were on the whole accurately identified.

Gallardo was a contemporary of Bruch and was also a professor. He had a fine estate on what is now the outskirts of metropolitan Buenos Aires. Outstanding studies were a mono-

graph of dolichoderine ants and studies of fungus-growers. Both Gallardo and Bruch published their last work in the early 1930's. A son of the former, Dr. Jorge Gallardo, is a distinguished herpetologist of Buenos Aires.

One of the earliest writers on the fauna was a favorite son of Argentina, W. H. Hudson. His book, "Idle Days in Patagonia," contains a good account of *Acromyrmex lobicornis* as determined by Emilio MacDonagh. The latter bridged the Gallardo-Bruch period and the present, dying in 1962. Contributors of the 1940's include J. B. Daguerre and J. C. Otamendi and, of the 1950's, L. De Santis and H. A. Zunino.

One of the few non-resident contributors was the European, W. Goetsch, who produced an excellent work on *Atta* and *Acromyrmex* in 1939.

Keeping the Gallardo-Bruch tradition alive were until recently Dr. Nicolas Kusnezov of the Instituto Lillo, University of Tucuman and Professor A. A. Bonetto and his associates of the University of Santa Fe. These universities are located in areas with a particularly rich fauna and the investigators have explored other parts of the country as well.

Dr. Kusnezov unfortunately is reported to have died January 1963 according to the Director of the Instituto Lillo, Dr. Abraham Willink (*in lit.*). Dr. Kusnezov in recent years had become increasingly preoccupied with evolutionary theory. I had visits with him in Buenos Aires and also in Tucuman, where he was generous with his time and offer of specimens. Of Russian origin, he has been widely quoted from Soviet publications under the name of N. Kuznetzov-Ugamsky. It is understood that he came to Argentina in 1948. Among his useful Argentine works are studies on Patagonian ants and an illustrated key to the fauna published in 1956 by the Ministry of Agriculture and Stockraising (Idia, Min. Agr. y Ganaderia, Agosto—Sept. 1956, pp. 1-56, Buenos Aires). This publication contains a good bibliography of Argentine works on ants.

Dr. Bonetto and his associates have been working on the ants of the Province of Santa Fe. These studies are subordinate to other duties he has in the Natural Resources section of the pro-

vincial Ministry of Agriculture and Stock-raising and the University of Santa Fe. His useful work on the leaf-cutting ants of the genera *Atta* and *Acromyrmex* was published in 1959 (Las Hornigas Cortadoras de la Provincia de Santa Fe, Dir. Gen. Recursos Naturales, Min. Agr. y Ganaderia, Prov. Santa Fe, pp. 1-87, Santa Fe). It also has a good bibliography.

The Argentine ant fauna is of particular interest to North Americans since Argentina occupies a temperate position in the Southern Hemisphere comparable to the United States in the north. Both are connected with the rich Neotropical fauna but differ greatly in the relatively few contributions this has made to the United States fauna while the Argentine fauna is an extension of the tropics. The grasslands and semi-deserts of Argentina, however, not only are comparable in general terms with the United States Middle and Southwest but their fauna is similar generically. Among the fungus-growing tribe of ants, both contain *Cyphomyrmex*, *Trachymyrmex*, *Acromyrmex* (*s. lat.*) and *Atta*. The notorious *Solenopsis saevissima richteri* of Argentina has become a successful and pernicious component of the fauna of southeastern United States.

Convergences in habits between Argentine and United States ants strike the observer. The mound-builders of the United States, so generally consisting of species of *Formica* in the northern and mountain states, are represented by species of other genera in Argentina. The western United States *Formica obscuripes* thatch mound is duplicated by *Acromyrmex ambiguus* and other species in its appearance, size and habitat. The latter, however, are fungus-growers derived from the Tropics to the north while *Formica* is a strictly Holarctic genus. The cosmopolitan *Camponotus* is not generally a mound-builder in the United States but in Argentina *punctulatus* forms large, isolated earth mounds covered with grass and herbs. These occur in the northeastern part of the country with mounds of the fire ant, *Solenopsis saevissima*. Both species may form mounds of 50-80 centimeters in height although those of the *Solenopsis* are more often in the 30-50 cm range. At the southern limit of the range of *Camponotus* in the New World, the

species (*chilensis* and *distinguendus*) nest inconspicuously in or under rotted wood as other species do at the northern limit.

In summary, Argentina may be commended to anyone interested in ants, both for the solid foundation already laid down by previous workers and for the nature of its fauna.

Two European Arachnids New to the United States

WILLIAM B. MUCHMORE, Department of Biology,
University of Rochester

It is well known that a number of European animals have become established in North America. Seaports such as New York, Halifax, St. John's and Seattle are known to have considerable populations of such exotics in their environs (cf. Lindroth, 1957). It has also become obvious in recent years that the inland city of Rochester, New York, has been a favorable locality for the establishment of European invertebrate animals, including the snail, *Cepaea nemoralis* (cf. Blakeslee, 1945); the chilopod, *Chaetechelene vesuviana* (cf. Crabill, 1955); various terrestrial isopods (cf. Muchmore, 1957); two small beetles (cf. Cooper, 1961, 1962); and the European hornet, *Vespa crabro* (personal observation). Recently, another remarkable introduction has been discovered in the vicinity of Rochester, namely the opilionid, *Trogulus tricarinatus* Linné (Opiliones: Trogulidae).

During the course of routine Berlese funnel separations in search of pseudoscorpions and terrestrial isopods, this distinctive arachnid was found in a sample taken on April 28, 1962 from beneath a log in deciduous woodland in Ellison Park, Monroe County, New York. With the aid of Roewer (1923) the specimen was identified as an adult of *Trogulus tricarinatus*, a species native to south and central Europe, and also found in southern England (Bristowe, 1949). It was then sent to Prof. C. J. Goodnight who was good enough to check the identification. Subsequently four more specimens were collected in Ellison Park. On May 26, 1962 an adult and a nymph were taken

from beneath the original log. The adult, like the first one found, is about 6 mm long and nearly black in color, apparently a mature individual that had survived the winter. The nymph is about 3 mm long and cream colored, and appears to be a third instar, according to Pabst (1953). On July 22, 1962 two adults were recovered from beneath a log some 500 feet from the first location. Slightly less than 6 mm long and light tan in color, these had probably hatched in the spring of 1962 and had become adult but not fully colored by the date of collection. With the trogulids were found a number of other invertebrates, including the uncommon trichoniscid isopod, *Hyloniscus riparius*, which is also native to central Europe (cf. Muchmore, 1957). It seems obvious from these facts that the specimens of *T. tricarinatus* were part of a population that has in some way been introduced and has found the Rochester area hospitable enough to allow its establishment.

It is not certain how and when the introduction of these immigrants might have occurred. There is, however, a nursery about a mile away from the collection site and nearby there is a well-travelled road, along which trash from human habitations has been dumped at various times. This situation is reminiscent of that in which I found *H. riparius* in Onondaga County, New York (cf. 1957, p. 79). It is probable, therefore, that the exotics were introduced along with nursery stock into the vicinity of the park and then transferred to their present location along with yard or garden refuse.

There have been suggestions that the introduction of these animals has been relatively recent, on the assumption that C. R. Crosby and S. C. Bishop, who collected arachnids intensively in this area, certainly would not have overlooked so unusual a creature as *Trogulus*. I can, however, find no record in the works of these arachnologists of their having collected in or near Ellison Park (cf. esp. Bishop, 1949). If the population occupies only a relatively small area, as is likely, it could easily have been by-passed by even the most expert collector. It is not inconceivable that many similar, undiscovered populations of this and other European invertebrates exist elsewhere in the United States.

It is appropriate here to mention also the occurrence in Rochester of the central European pseudoscorpion, *Roncus lubricus* L. Koch (Chelonethida: Neobisiidae) (cf. Beier, 1932). The first specimen was taken in the greenhouse of the University of Rochester on June 27, 1956. It was on the underside of a board partially embedded in the earth under a greenhouse bench. Subsequently, other specimens were found under boards or flats in the same room, in company, at various times, with a variety of greenhouse inhabitants, including isopods, mites, spiders, centipedes, millipedes, collembola and snails. The only other pseudoscorpion observed in the greenhouse has been the common, introduced European species, *Chthonius tetrachelatus* Preyssl. On one occasion a specimen of *R. lubricus* was discovered with an oribatid mite (*Oribotritia*?) in its chelicerae, obviously feeding.

Roncus lubricus was observed in the greenhouse from time to time until June, 1958. Altogether four specimens (2 males and 2 females) were collected and perhaps another four or five were seen. The population then disappeared, apparently eradicated, along with undesirable sowbugs and slugs, by the continued heavy application of pesticides.

This species, unlike *C. tetrachelatus*, has never been encountered outside the greenhouse and is, so far as we know now, not a naturalized resident in this country.

REFERENCES

- BEIER, M., 1932. Tierreich 57: 1-258.
BISHOP, S. C., 1949. Proc. Rochester Acad. Sci. 9: 159-235.
BLAKESLEE, C. L., 1945. Nautilus 59: 44-47.
BRISTOWE, W. S., 1949. J. Anim. Ecol. 18: 100-114.
COOPER, K. W., 1961. ENT. NEWS 72: 90-92.
—, 1962. ENT. NEWS 73: 187-190.
CRABILL, R. E., 1955. ENT. NEWS 66: 248-249.
LINDROTH, C. H., 1957. The Faunal connections between Europe and North America. Wiley, New York. 344 p.
MUCHMORE, W. B., 1957. J. Washington Acad. Sci. 47: 78-83.
PABST, W., 1953. Zool. Jahrb. Abt. f. Syst. 82: 1-46.
ROEWER, C. F., 1923. Die Weberknechte der Erde. Gustav Fischer, Jena. 1116 p.

A Neotype for *Coenonympha ochracea* Edwards (1861.) *

F. MARTIN BROWN, Research Associate, Carnegie Museum,
Pittsburgh, Pennsylvania; Research Associate, American
Museum of Natural History, New York, New York

The following paper was submitted to Dr. W. E. China, Acting Secretary to the International Commission on Zoological Nomenclature. At his request it is being published in full form in the *Entomological News* and in abstracted form in the *Bulletin of Zoological Nomenclature*.

Application to the International Commission on Zoological Nomenclature to Consider *Coenonympha ochracea* Edwards for Placement on the Official List of Specific Names in Zoology

1. William Henry Edwards in 1861 described a butterfly, to which he applied the name *Coenonympha ochracea*, from a mixed series of specimens from "Lake Winnipeg, California, Kansas," representing three distinct taxa.
2. From 1861 onward Edwards consistently applied the name *Coenonympha ochracea* to that fraction of the superspecies *Coenonympha tullia* Mueller (1764) that is found in the Rocky Mountain system from northern New Mexico into Montana and westward into at least the eastern portion of the mountainous areas of the Great Basin. This restricted the name to one of the three taxa confused in the original description.
3. Until very recently there has been no deviation from the application used by Edwards throughout his active life. All published catalogues of North American butterflies employ this concept of the name *ochracea*. (Edwards, 1868-1871; Kirby 1871; Edwards, 1872; Scudder, 1875; Scudder,

* This study has been supported in part by National Science Foundation grant GB-194, devoted to a study of the names of butterflies proposed by W. H. Edwards.

1876; Edwards, 1877; Strecker, 1878; Edwards, 1884; Smith, 1891; Skinner, 1898; Dyar, 1903; Smith, 1903; Wright, 1905; Barnes and McDunnough, 1917; Barnes and Benjamin, 1926; Gaede, 1931; McDunnough, 1938; dosPassos, 1939; see dosPassos, 1956, for complete citations.)

4. Holland in 1898 and again in 1931 used the name *ochracea* for the Rocky Mountain form of *tullia* and on pl. XXV, fig. 12, showed the under side of a strongly ocellate specimen from the region. A similar specimen was figured by Brown, Eff and Rotger in 1954 on page 13.
5. Skinner in 1900 on plate VII figures 12, 13 and 14 showed the range of variation commonly found on the under side of the mountain form, for which he used the name *ochracea* Edwards. The specimen shown in figure 12 from Bear Creek, Jefferson County, Colorado, is essentially a topotype of the "Kansas" syntype of the name *ochracea*.
6. Weymer in 1911 applied the name *ochracea* to the Rocky Mountain form of *tullia* and on pl. 50, line b, fourth figure, presented the under side of a specimen bearing the minimum development of the ocelli found rather rarely in the Rocky Mountain region.
7. Davenport in 1941 stated in his monograph of the genus *Cocnonympa*, the first serious revision of the genus on a world-wide basis, that (p. 268) "A careful examination of Edwards' description of *ochracea* will show that it is an accurate description of the Rocky Mountain race; he stresses the strong row of ocelli and the similarity of males and females."
8. Davenport's examination of the type of *ochracea* was made previous to 1936 (personal communication). In his monograph (*l.c.*, p. 268) he stated "The female labelled 'type' in the Edwards material conforms with the description, as has been said, but it is labelled 'Lake Winnipeg.' . . .

"To complicate matters a series of specimens from Lake Winnipeg in the possession of Mr. Frank Chermock of Pittsburgh, to whom and to whose brother, Mr. Ralph

Chermock, I am much indebted for material and information on this problem, are good *benjamini*." And on p. 269 Davenport stated "I believe, therefore, that the name *ochracea* should stand for the mountain race; I also question the validity of the ♀ type in the Carnegie Museum."

9. Chermock and Chermock in 1938, in an attempt to revive the Edwardsian name *brenda* (1869) which was based upon material apparently mislabelled from Los Angeles, California, argued that *ochracea* (consistently misspelled *ochracia* by these authors) must be applied to the Manitoba form of *tullia* and that *brenda* is the proper name for the Rocky Mountain form.
10. Brown, in preparing the second of a series of studies of *tullia* in North America, has found that the locus of material comparable to the original description of *ochracea* is the Rocky Mountain system proper and its westward outliers in the Great Basin, while the type of *brenda* represents the dominant form in the more western parts of the Great Basin and occurs in the foothills of the western slope of the Rocky Mountains at lower altitudes than does *ochracea*. He suspects that the dilution of the ocellate condition, prevalent on the eastern slope of the Rocky Mountains and in the mountainous areas, may have been caused by admixture from the gene-pool of the currently eastern Canadian form of *tullia*, called *inornata* Edwards 1861. This could have happened during the maximum of the Wisconsin glacial period of the Pleistocene Era when conditions in the middle and lower Mississippi Valley and the Great Plains were such that the western fringe of the range of *inornata* impinged upon the eastern fringe of the Rocky Mountain strain, postulated to have been similar to *brenda*. Similarly, the western portion of the Canadian subspecies *inornata* Edwards received an admixture from the Rocky Mountain form and produced *benjamini* McDunnough.
11. There are three immediately noticeable differences between the mountain form of *tullia*, usually called *ochracea* Edwards, and the prairie form, usually called *benjamini* McDunnough:

- 1) On the under side of the hind wing there is invariably a series of submarginal ocelli, usually black-centered, very rarely mere white points, on the mountain form. This area on the prairie form from Manitoba, Canada, usually shows no indication of submarginal ocelli on the under side of the hind wing, but there do occur occasional white points in this area on less than 20% of the males and less than 10% of the females examined. The prairie form from the western and southern perimeter of its range shows these white points on up to 50% of the males and 75% of the females. (See Brown, 1955, p. 393, tab. 17.)
- 2) On the under side of the hind wing at the base there are found invariably on the mountain form two, infrequently one, irregular ochre patches: At least faint traces of these patches occur on less than 10% of the males and about 15% of the females from Manitoba representing the prairie form of *tullia*. Of over 190 males examined from the total range of the prairie form, *benjamini* McDunnough, only five showed at least traces of these patches, and of 55 females examined, only two showed such traces. These traces were found most frequently in the series from Manitoba. (See Brown, 1955, p. 394, tab. 19.)
- 3) The males and females of the mountain form of *tullia* in the Rocky Mountains are almost identical in color on the upper side, the females being very slightly lighter ochre: There is a striking difference in the color of the upper side of the sexes of the prairie form. (See Brown, 1955, pp. 395, 397, tabs. 19, 20.)
12. The specimen in the Carnegie Museum, Pittsburgh, Pennsylvania, that bears a holograph label, prepared by W. H. Edwards, reading "Ochracea ♀/Winnipeg/type 1861" received that label at the time that W. H. Edwards shipped his collection to W. J. Holland, probably at the time that Edwards packed the material shipped on September 10, 1891 (letter from Edwards to Holland, and in the files of the Carnegie Museum; photocopy H 166, in library F. M. Brown.) There is every reason to believe that Edwards

attached this label to the original Winnipeg specimen. Along with it Edwards shipped 11 other *ochracea*. Those remaining of the series, except the "type," are typical of the Rocky Mountain form.

13. The reputed type of *ochracea* is a female, it is a little lighter than the average Manitoba specimen, but not seriously so; it bears a single white point in the submargin of the under side of the hind wing and conforms, in this respect, with a distinct minority of specimens that have been examined from Manitoba; it has well developed light patches at the base of the under side of the hind wing, quite the most distinct and largest seen on a Manitoba female related to *tullia*. It represents an extreme, but normal, variant of the form of *Coenonympha tullia* now recognized as *benjamini* McDunnough.
14. In a letter written by W. H. Edwards to W. G. Wright on 18 September 1885 (now in the archives of the Pacific Coast Entomological Society and housed in the California Academy of Science, San Francisco, California, bearing my index number 211.) Edwards wrote "where a species is desc [ribe] d from several specimens, the describer may select one nearest his description (if that is from an average) and call it the type. I usually describe one individual and note variations from others." Edwards did not label any of his specimens as "type" until asked to do so by Holland at the time that Holland purchased Edwards' collection (see Brown 1962). In the light of Edwards' statement to Wright, the Lake Winnipeg syntype of the name *ochracea* was not his model for the original description, but the variant that caused him to add "sometimes obsolete" to his description of the row of ocelli. As Davenport pointed out (para. 6 above) the original description of *ochracea* applies best to the Rocky Mountain form.

Edwards' statement to Wright, quoted above explains why the original description best fits the Rocky Mountain form and at the same time encompasses the Lake Winnipeg syntype. He based his description upon the Rocky Moun-

tain form and modified it to include the prairie form as represented by an extreme specimen.

15. Article 24 of the Code, sustaining the principle of first revisor, is not clear on the point in question relating to the use of the name *Coenonympha ochracea*. Davenport in 1941 was the first revisor of the genus *Coenonympha*. It was his prerogative to select from the three areas mentioned in the original description of *ochracea* that area that sustains a form of *Coenonympha* best described in the original description. This he did in selecting the Rocky Mountains. ["Kansas," at the time the specimens in the type series before Edwards were collected, extended westward to the Continental Divide, now in the state of Colorado. The Territory of Colorado was established in February 1861, the year in which Edwards' paper was published. Edwards in all probability had received the "Kansas" material from William S. Wood, Jr., who had collected in the foothills of the Rocky Mountains in Jefferson County, west of the present city of Denver, Colorado, in 1859, when the region was in "Kansas." (See Brown 1957.) A letter from George Newman to W. H. Edwards, in the Archives of the State of West Virginia, Charleston, West Virginia, arranged with Edwards an exchange for Wood's butterflies.] Davenport's action conformed with the author's (Edwards) treatment of the name. The actions of fate preserved the Lake Winnipeg syntype of the name and not the "Kansas" syntype. The question is: Does a first revisor have the power to ignore a single surviving syntype that poorly fits the original description, a description based upon a mixture of specimens representing three taxa, in favor of adopting the interpretation of the author of the name in all of his subsequent applications of the name?

Adoption of the Lake Winnipeg syntype as the recognized lectotype of the name *ochracea* will require transfer of the familiar specific name of the Rocky Mountain form of *tullia* to the prairie form, known consistently as *benjamini* McDunnough since that name was proposed in 1928.

The Rocky Mountain form will then take on the name *brenda* Edwards 1869, based upon obviously mislabelled specimens, for which the true type locality is not known, and currently considered a synonym of *ochracea*.

16. In 1956, Burdick proposed the name *phantasma* for specimens of the *Coenonympha tullia* complex from Eldora, Boulder County, Colorado. He proposed this name for the "race from the Front Range of Colorado." Edwards' "Kansas" syntypes were collected in this range of the Rocky Mountains. Burdick's photographic illustration of the holotype of *phantasma* shows it to be a good representation of the high altitude form of the taxon present in the region. In this article Burdick applied *ochracea* Edwards to the strongly ocellate more western form that approaches or is *brenda* Edwards. His figure of *benjamini* represents a characteristic specimen of that taxon. Edwards' original description of *ochracea* is sufficiently broad to encompass the specimens figured by Burdick as *ochracea* and *phantasma*.
17. As Ehrlich pointed out in 1961, the "biological species concept" is very difficult to apply in the genus *Coenonympha* in North America. The reason for this clearly is the multiplicity of clines involved in the *tullia*-complex as it appears on that continent. The biological phenomenon of the cline is not considered in the current Code. My philosophy is to adopt a single name for a cline, that which has priority, and to reduce all later names applying to either the termini or intermediate points on the cline to synonyms of that earliest name applied. If the Lake Winnipeg syntype of *ochracea* is adopted as the lectotype of the name, then *phantasma* Burdick 1956 will be available as the name for the least ocellate specimens of the Rocky Mountain taxon and *brenda* Edwards 1869 for the most ocellate. The two names represent the termini of a cline. If the Lake Winnipeg syntype is rejected and the "Kansas" syntype carries the name, then the name *phantasma* Burdick 1956 will become a synonym of *ochracea* Edwards 1861, and that name be used for the the cline.

18. It is believed that stability of nomenclature will be furthered by depositing the Lake Winnipeg syntype; adopting Jefferson County, Colorado, as the type locality for *ochracea*; and designating a specimen, more in keeping with the original description than is the Lake Winnipeg syntype, as neotype and selecting that specimen from Jefferson County material.

Pending confirmatory action of the Commission I hereby designate as the neotype of the name *ochracea* Edwards (1861) a male specimen from my collection bearing a label that reads "Turkey Creek/Jefferson Co., Colo./8,000 ft./9.vii.56" to the pin of which I have added a label reading "Neotype/*Coenonympha ochracea* ♂/W. H. Edwards/designated by/F. M. Brown 1963/supported by action/of I C Z N." The specimen has been placed with the Edwards Collection in the Carnegie Museum, Pittsburgh, Pennsylvania.

REFERENCES

- BROWN, F. M. 1955. Studies of nearctic *Coenonympha tullia* (Rhopalocera, Satyridae). *Coenonympha tullia inornata* Edwards. Bull. Amer. Mus. Nat. Hist. 105: 363-409, especially pp. 387-394.
1957. Two early entomological collectors in Colorado. Entom. News 68: 41-47, especially pp. 42-45.
1962. Notes about the types of some species of butterflies described by William Henry Edwards. Entom. News 73: 265-268.
- BROWN, F. M., with D. EFF and B. ROTGER. 1954. Colorado Butterflies part I, Satyridae. Proc. Denver Mus. Nat. Hist. 3: 1-32.
- BURDICK, W. N. 1956. A new concept for the *Coenonympha* of the Front Range of Colorado (Satyridae). The Lepidopterists' News 10: 81-86.
- CHERMOCK, F. H., and R. L. CHERMOCK. 1938. *Coenonympha ochracia* [sic] and *brenda*. Proc. Pennsylvania Acad. Sci. 12: 49-50.
- DAVENPORT, D. 1941. The butterflies of the satyrid genus *Coenonympha*. Bull. Mus. Comp. Zool., Harvard College 87: 215-349, pls. 1-10, especially pp. 266-269, pl. 5 and pl. 10.
- DOSPASSOS, C. F. 1956. A bibliography of general catalogues and check lists of nearctic Rhopalocera. The Lepidopterists' News 10: 29-34.
- EDWARDS, W. H. 1861. Description of certain species of Diurnal Lepidoptera, found within the limits of the United States and of British America. Proc. Acad. Nat. Sci. Philadelphia 13: 160-164, especially page 163.

- EHRlich, P. R. 1961. Has the biological species concept outlived its usefulness? *Systematic Zoology*, 10: 167-176.
- HOLLAND, W. J. 1898. "The Butterfly Book." Doubleday, Page and Co., Garden City, New York.
1931. *The Butterfly Book*, revised edition. Doubleday, Doran and Co., Garden City, New York.
- SKINNER, H. 1900. Revision of the American species of the genus *Coenonympha*. *Trans. Amer. Ent. Soc.* 26: 299-309, pl. VII.
-

Two New Species of *Paratiphia* (Tiphidae: Hymenoptera) from the Western United States¹

H. W. ALLEN²

Of the two species described in this paper, *Paratiphia verna* appears to be common in Riverside and San Diego Counties, California in April and May, and *P. asotinae* has been described from a long series collected by Dr. J. M. Aldrich many years ago. Material examined belongs in the collections of the United States National Museum [USNM], the California Academy of Sciences [CAS], and the California Insect Survey [CIS]. Paratypes of the male sex have been deposited in the collection of the Academy of Natural Sciences of Philadelphia.

Paratiphia verna new species

Male.—Hairs of middle front and dorsum of pronotum long and dense. Terminal rows of bristles on abdominal terga are complete over middle on terga 2 to 6 but are short and sparse in middle section of tergum 2; bristles on tergum 2 (as an example) are not single ranked laterally, are of unequal length and are separated by intervals less than average thickness of the bristles.

¹ The research on which this paper is based is supported by a National Science Foundation Grant.

² Research Associate, Academy of Natural Sciences of Philadelphia and Collaborator, Entomology Research Division, U. S. Department of Agriculture, Moorestown, N. J.

Head 1.0 times as long as wide. Clypeus almost entirely white, conspicuously convex; shortest distance between eyes 1.4 times clypeal length. Mandible with an opaque white spot near its base.

Dorsum of pronotum with transverse carina relatively low, its bordering groove shallow and not cross-ribbed. Side of pronotum with its anterior projection usually obsolete, at most restricted to a barely visible obtuse angle the height of which is less than diameter of an ocellus. Mesepisternum with prepectal groove usually short, shallow and terminating above about width of tegula from upper margin. Tegula slightly longer than broad with the usual elongated inner angle. Forewing with membrane whitish hyaline with minute, short, black, stubby bristles sparsely distributed except at wingtip and in adjacent radial and cubital cells; stigma ratio of length to width 3.2 (measurements of two were 3.2 and 3.2); radial cell ratio of length to width 2.6 (measurements of two were 2.6 and 2.6); first cubital cell ratio of length to width 3.0 (measurements of two were 3.1 and 2.8); second cubital cell ratio of length to width 1.7 (measurements of two were 1.7 and 1.7); ratio of length of first cubital cell to length of second cubital cell is 1.4 (measurements of two were 1.6 and 1.3).

Dorsum of propodeum with areola frequently poorly defined; area beside it is shallowly sculptured; anterior transverse carina weak, sinuous or angular, often absent, at its nearest approach to spiracle it is about halfway between it and posterior carina. Dorsum of pygidium not medially carinate; punctate part 1.4 times as long as wide, not abruptly depressed on anterior border.

Length, 6 to 10 mm.

Female.—Hairs of front and dorsum of pronotum moderately long and conspicuous. Hind and middle tibia on outside thickly set with very long hairs. Terminal bristles of abdominal terga white and not well-differentiated from the adjacent long hairs; those of tergum 2 (as typical) are confined to lateral third of tergum and are not regularly ranked; bristles of pygidium are usually sparse and relatively short.

Mandible 3.6 times as long as greatest width, lower edge abruptly widened near middle.

Dorsum of pronotum without a transverse carina. Side of pronotum without trace of an anterior toothlike projection. Tegula of normal length and outline. Forewing slightly infuscated; hairs of membrane dark, those of radial cell exceptionally long and slender, most approximating 10 times as long as basal thickness; veins coarse and dark; curve at base of subdiscoidal vein prominent, preapical section 1.5 times length apical section (two measured were 1.5 and 1.5). Hindwing with membrane hyaline; hooks 13 to 15, average 14.

Dorsum of propodeum with rugulae limited to apical third, at side there is often a weakly developed anterior transverse carina; areola usually slightly longer than wide with slightly convex sides. Sixth sternum with its apex a thickened roll conspicuously convex on upper surface. Pygidium with pebbly apex tapered, 1.25 times as wide as long (measurements of two were 1.2 and 1.3), margin usually slightly concave between end of lateral fold and apex; pebbly to apex but terminal elements are much smaller than those near base.

Length, 8 to 11 mm.

Type.—Male; Banning, Riverside Co., CALIF.; June 26, 1952 (J. W. MacSwain) [CIS].

Allotype.—Female; same data as type and originally mounted on same pin with it [CIS].

Paratypes.—CALIFORNIA: 1 ♂; Banning, Riverside Co.; July 9, 1950 (P. D. Hurd) [CIS]. 7 ♂♂, 1 ♀; Banning, Riverside Co.; July 27, 1952 (2 by J. J. Menn, 2 by W. V. Garner, 4 by J. Linsley) [CIS]. 14 ♂♂, 1 ♀; Bonanza Mine, Providence Mts. (Van Duzee) [CAS]. 2 ♂♂; Borego, San Diego Co. (one of these on *Croton californicus*); April 30, 1952 (M. Washbauer) [CIS]. 1 ♂, 2 ♀♀; Borego, San Diego Co., on *Croton californicus*; April 25, 1954 (M. Washbauer) [CIS]. 2 ♂♂; Borego, San Diego Co.; April 24, 1955 (1 by P. D. Hurd, 1 by R. Schuster) [CIS]. 1 ♀; Borego, San Diego Co., on *Croton californicus*; April 27, 1954 (M. Washbauer) [CIS]. 1 ♂; Borego, San Diego Co.; April 29, 1954 (P. D. Hurd) [CIS]. 1 ♂ Borego, San Diego Co.; April 26, 1955 (R. O. Schuster) [CIS]. 1 ♂, 1 ♀; Borego, San Diego Co., on *Erio-*

gonum inflatus; April 28, 1955 (M. Washbauer) [CIS]. 1 ♂; Borego, on *Croton californicus*; May 3, 1956 (B. J. Adelson) [CIS]. 40 ♂♂; Borego V., San Diego Co.; (38 on May 20, 1941, 2 on May 21, 1941) (E. C. Van Dyke) [CAS]. 5 ♂♂; Borego V., San Diego Co. (3 on April 29, 1955, 1 on May 12, 1955, 1 on April 18, 1956) (F. X. Williams) [CAS]. 2 ♂♂, 3 ♀♀; Box Canyon, Riverside Co.; April 26, 1952 (2 by G. A. Marsh, 2 by J. G. Rosen, 1 by P. D. Hurd) [CIS]. 5 ♂♂; Hopkins Well, Riverside Co.; April 28, 1952 (G. A. Marsh) [CIS]. 33 ♂♂, 1 ♀; Hopkins Well, Riverside Co.; April 29, 1952 (27 by J. G. Rosen, 7 by P. D. Hurd) [CIS]. 3 ♂♂; Mecca, Riverside Co.; April 25, 1952 (G. A. Marsh) [CIS]. 1 ♀; 4 mi. E. of Mecca, Riverside Co., on *Croton californicus*; July 21, 1956 [CIS]. 2 ♂♂; Morengo V., Riverside Co. (E. C. Van Dyke) [CAS]. 1 ♂; Mojave Desert; 1932 [USNM].

NEVADA: 11 ♂♂; Tonopah, on *Asclepias*; March, 1941 (Howell) [CAS]. 10 ♂♂; Tonopah, on *Asclepias*; May, 1941 (Howell) [CAS].

Paratiphia asotinae new species

Male.—Hairs of front and dorsal pronotum short and not dense; on side of first tergum scarcely more than 5 as long as adjacent apical bristles. Apical bristles of nearly same length and density of distribution from side to near median line on terga 2 and 3, in a single rank; bristles expanded to near apices and separated by interspaces scarcely equal to their average basal thickness.

Head length 1.1 times width. Clypeus with a white mark more than twice as broad as long; shortest distance between eyes 2.2 clypeal length. Mandible broadly opaque white at base.

Dorsum of pronotum with its transverse carina relatively low, its bordering groove shallow and not cross-ribbed. Side of pronotum with its anterior carina near humeral angle protruding in a broad, high tooth about equally declivous on upper and lower slopes and wider than high, the lower margin continued as a sharp carina which gradually diminishes in height. Prepectal furrow on mesepisternum broad, deep, cross-ribbed. Tegula slightly longer than broad with the usual elongated inner angle. Forewing with membrane whitish hyaline, its hairs inconspicu-

ous, short, sparse, blackish; radius merging with costa usually at an angle not spurred and near middle of apex of radial cell; stigma length to width 2.6 (two measured were 2.6 and 2.7); radial cell length to width 2.4 (two measured were 2.4 and 2.4); first cubital cell length to width 2.7 (two measured were 2.7 and 2.8); second cubital cell length to width 1.8 (two measured were 1.8 and 1.9); length of first cubital cell to second cubital cell 1.4 (two measured were 1.4 and 1.4).

Dorsum of propodeum with areola sharply defined; area lateral to it only shallowly sculptured; anterior transverse carina sharp and high, at lateral terminus separated by distance equal to distance between anterior carina and spiracle. Dorsum of pygidium not medially carinate except the extreme apex; punctate part 1.2 times as long as wide.

Length, 5.5 to 8 mm.

Female.—Hairs of head and dorsum of pronotum short and sparse. Apical bristles of tergum 2 well-developed only on lateral third of tergal width, not regularly one-ranked; decreasing rapidly in length toward median line, whitish, broadly expanded, and separated by less than basal diameters; bristles of pygidium long, slender, extending far over impunctate part.

Dorsum of pronotum with many interspaces on disc wider than diameters of adjacent primary punctures. Tegula as described for the male. Forewing with membrane slightly fulvous, hairs dark and stubby; veins fulvous; subdiscoidal vein with preapical section .95 times length of apical section (two measured were .95 and .95). Hindwing with membrane hyaline; 14 marginal hooks (two counted were 14 and 14).

Dorsum of propodeum having an areola that is triangular and longer than wide; area beside it without well-developed sculpturing; longitudinal rugulae fine, mostly straight, confined to apical third of lateral part. Pygidium with its apex coarsely pebbly, the elements coarse and strongly contoured medially, fading out without much diminution in size apically; apex thin and flexible; width of impunctate apex is 1.2 times its length.

Length, 8 mm.

Type.—Male; Asotin, WASH.; flowers of wild parsnip; June 21, 1932 (J. M. Aldrich) [USNM].

Allotype.—Female; same data as type [USNM].

Paratypes.—31 ♂♂ and 2 ♀♀; same data as type [USNM].

The females which were collected at the same time and place as the males are presumably the same species. The male seems to be related to *ephippiata* Allen occurring commonly from Arizona and Texas southward, but differs in having some black hairs on the wing membrane and a less abruptly elevated anterior process of the side of the pronotum.

Nomenclature Notice

Comments relating to the following should be marked with the Commission's file number and sent in duplicate to the Secretary, International Commission of Zoological Nomenclature, c/o British Museum (N.H), Cromwell Road, London, S.W.7, England.

Suppression of certain Aphid names of Rafinesque (Hemip.), Z.N.(S.) 327. Designation of a type species for **Mymar** Curtis, 1829 (Hym.) Z.N.(S.) 479. Validation of **Psylla** Geoffroy, 1762 and suppression of **Chermes** Linnaeus, 1748 (Hemip.), Z.N.(S.) 1515. Comments are due October 11.

Validation of **Pemphigus** Hartig, 1839 (Hemip.), Z.N.(S.) 431. Validation of **Bironella gracilis** Theobald, 1905 (Dipt.), Z.N.(S.) 1244. Designation of a type species for **Ctenophthalmus** Kolenati, 1856 (Siph.), Z.N.(S.) 1523. Validation of **Xylocopa** Latreille, [1802–1803] (Hym.), Z.N.(S.) 1527. Validation of emendation to **Rhynchium** of **Rygchium** Spinola, 1806 (Hym.), Z.N.(S.) 1540. Suppression of **Eulachnus** Del Guericco, 1909 (Hemip.), Z.N.(S.) 1541. Comments are due October 26.

For details see Bull. Zool. Nomencl. 20 (2) and (3).

The Collembola of New Mexico. X. Entomobryinae: Drepanocyrtus, Willowsia, Lepidocyrtus, Pseudosinella^{1, 2}

HAROLD GEORGE SCOTT³

Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Genus DREPANOCYRTUS Handschin, 1925

Body elongate, not subglobose; scales present; eyes 8 and 8, on dark eyepatches; antenna 4-segmented, distal segments never annulate; prothorax naked, greatly reduced; Abd IV more than $2\frac{1}{2}$ times length of III; dentes crenulate dorsally, with scales ventrally; mucronal teeth absent; mucronal spines absent.

KEY TO SPECIES OF NEARCTIC DREPANOCYRTUS

1. Th II—Abd III with dark purple markings.....
.....**mexicanus** (Folsom, 1898)
Th II—Abd III white.....**reinhardi** Mills, 1931

NOTE: *D. terrestris* Folsom, 1932, from Hawaii seems to be *D. reinhardi*. *D. dowlingi* Wray, 1953, is recorded from Puerto Rico.

Drepanocyrtus mexicanus (Folsom, 1898), new combination
Seira mexicana Folsom, 1898
Lepidocyrtus mexicanus Handschin, 1928

DISCUSSION. *D. mexicanus* showed the strictest habitat specificity of any species in the New Mexico study. Folsom (1898) reported it from grasses and "upon old cocoons on *Salix Humboldtiana*."

¹ A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico, Albuquerque, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

² Part IX, Ent. News, 74 (1) : 9-18.

³ Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta 22, Georgia.

NEW MEXICO RECORDS. Ten collections, all from beneath tight bark of yellow pine logs; 6,500 to 9,200 ft; San Miguel, Valencia, Torrance, Catron, and Lincoln Co.; June to Aug., 1951-1952.

DISTRIBUTION. Calif., N. M.; Mexico, D. F. and State of Mexico (Mexico).

Genus **WILLOWSIA** Shoebbotham, 1917

(= **SIRA** Lubbock, 1870)

Body elongate, not subglobose; scales present; antenna 4-segmented, never annulate; eyes 8 and 8, on dark eyepatches; Abd IV more than $2\frac{1}{2}$ times length of III; dentes dorsally crenulate; mucro with 1 tooth and 1 basal spine.

KEY TO SPECIES OF UNITED STATES WILLOWSIA

(including Alaska, Hawaii and Puerto Rico)

1. Blue to violet. **buski** (Lubbock, 1869)
Yellow to gray with blue markings. . **platani** (Nicolet, 1841)

Willowsia buski (Lubbock, 1869)

NEW MEXICO RECORDS. From Berlese sample of woody debris of hollow tree root, yellow pine-fir community, 7,500 ft, San Miguel Co., 6-vii-1953.

DISTRIBUTION. Calif., Colo., Conn., Fla., Ill., Iowa, Maine, Md., Mass., Minn., N. M., N. Y., Penna., Utah, Vt., Wash.; Alberta and Ontario (Canada); Iceland; Europe.

Willowsia platani (Nicolet, 1841)

NEW MEXICO RECORDS. With ants from nest beneath dung, grassland 8,500 ft, Colfax Co., 14-vii-1953; Berlese sample of oak litter, 7,800 ft, McKinley Co., 7-ix-1951; bathtub in house, 5,000 ft, Bernalillo Co., 21-vi-1950.

NOTE. Many collections of this species have been from human habitations (Scott, et al., 1962). It was reported infesting decayed insulation of a refrigeration plant (Sanders, 1940).

DISTRIBUTION. Calif., Conn., Fla., Idaho, Ill., Iowa, Kansas, La., Mass., Maine, Minn., N. M., N. Y., Texas, Utah; Labrador and Ontario (Canada); Europe, Australasia.

Genus **LEPIDOCYRTUS** Bourlet, 1839

Body elongate, not subglobose; scales present; antenna 4-segmented, not annulate; eyes 8 and 8, on dark eyepatches; Abd IV usually more than $2\frac{1}{2}$ times length of III; dentes crenulate dorsally, scaled ventrally; mucro with 1 tooth and 1 basal spine.

NOTE. The name *Lepidocyrtus* is stabilized by the International Commission on Zoological Nomenclature, Opinion 291 (Name 720), signed 3 March 1954, published 12 October 1954.

KEY TO SPECIES OF UNITED STATES **LEPIDOCYRTUS**

(Including Alaska, Hawaii and Puerto Rico)

1. Body with some dark markings.....2
Body entirely white (eyespot may be dark).....13
2. Abd IV less than twice length of III.....
.....**inornatus** Folsom, 1932
Abd IV 3-6 times length of III.....3
Abd IV 10-12 times length of III.....11
3. Th II projecting strongly over head.....4
Th II not projecting over head or only slightly.....6
4. Abd IV about 4 times length of III.....
.....**christianseni** Goto, 1953
Abd IV about 6 times length of III.....5
5. Abd IV with mid-dorsal purple band.....
.....**unifasciatus** James, 1933
Abd III or III-IV with lateral purple spots.....
.....**finensis** Maynard, 1951
6. White, with or without limited blue to purple markings...7
Yellow, with orange, red, blue or purple markings.....8
Violet.....9
Deep purple, blue, or gray.....10
7. Abd IV 4.5 times length of III.....**usistatus** Folsom, 1927
Abd IV about 6 times length of III.....
.....**curvicollis** Bourlet, 1839
8. With orange to red flecks.....**aurantiacus** Maynard, 1951
With scant purple markings...**nigrosetosus** Folsom, 1927
With purple band of Th II-III + Abd I-III.....
.....**beaucatcheri** Wray, 1946
9. Abd IV about 5 times length of III.....
.....**violaceus** (Geoffroy, 1762)
Abd IV 3-4 times length of III...**pusillus** (Linnaeus, 1767)

10. Head yellow.....**guthriei** Maynard, 1951
Head not yellow.....**cyaneus** Tullberg, 1871
11. Blue-black to black.....**alleganyensis** Maynard, 1951
White with blue to purple markings.....12
12. Abd IV with mid-dorsal purple band.....
.....**summersi** (MacGillivray, 1894)
Abd IV without purple markings.....
.....**lanuginosus** (Gmelin, 1767)
13. Th II projecting strongly over head.....
.....**heterophthalmus** Carpenter 1904
Th II not projecting strongly over head.....14
14. Abd IV about 6 times length of III.....
.....**curvicollis** Bourlet, 1839
Abd IV about 3-4 times length of III.....15
15. Tenent hair knobbed.....**immaculata** Folsom, 1932
Tenent hair unknobbed.....
.....**candida** (Folsom, 1902), new combination
(= **Pseudosinella candida**)

NOTE. Not included in key is *L. caprilesi* Wray, 1953, from Puerto Rico.

Lepidocyrtus curvicollis Bourlet, 1839

NEW MEXICO RECORDS. From Berlese sample of oak litter, 7,000 ft, Bernalillo Co., 30-iii-1952.

DISTRIBUTION. Calif., Conn., Ill., Iowa, Maine, Mass., N. M., N. Y., Pa., Ontario (Canada), Europe, Africa.

Lepidocyrtus cyaneus Tullberg, 1871

NEW MEXICO RECORDS. Once with ants beneath dung, and 8 Berlese samples (1 alder-fir litter, 1 fir litter, 1 fir log, 4 cottonwood litter, 1 cottonwood log); 4,100 to 8,500 ft; Bernalillo, Colfax, Dona Ana, Sandoval, Socorro, and Taos Co., May-Nov., 1949-1954.

DISTRIBUTION. Alaska, Calif., Conn., Hawaii, Idaho, Ill., Iowa, Kansas, La., Maine, Md., Mass., Minn., N. M., N. Y., N. C., Ohio, Tenn., Texas, Utah, Wash.; Northwest Territories and Ontario (Canada); State of Mexico (Mexico); Greenland, Europe, Asia, Africa, Australasia.

Lepidocyrtus guthriei Maynard, 1951

NEW MEXICO RECORDS. From beneath bark, yellow pine log, 8,200 ft, Torrance Co., 3-vii-1953; Berlese sample, yellow pine-

fir litter, 7,500 ft, San Miguel Co., 6-vii-1953.

DISTRIBUTION. Minn., N. M., N. Y.

Genus **PSEUDOSINELLA** Schaffer, 1897

Body elongate, not subglobose; scales present; eyes absent or as many as 8 on each side; distal antennal segments never annulate; Abd IV more than $2\frac{1}{2}$ times length of III; dentes crenulate dorsally, scaled ventrally; mucro with 1 tooth and 1 basal spine.

KEY TO SPECIES OF UNITED STATES PSEUDOSINELLA

(including Alaska, Hawaii, and Puerto Rico)

1. Eyes 6×6 2
 Eyes 5×5 3
 Eyes 4×4 5
 Eyes 3×3*sexoculata* Schott, 1902
 Eyes 2×2 6
 Eyes 1×1*hirsuta* (Deboutteville, 1949)
 Eyes absent.....8
2. Unguis with 2 inner teeth.....*collina* Wray, 1952
 Unguis with 3 inner teeth.....*duodecimpunctata* Denis, 1931
3. Inner teeth of unguis subequal.....4
 Inner teeth of unguis unequal.....
 *duodecimpunctata* Denis, 1931
4. Eyepatch ovid.....*decemoculata* (Guthrie, 1903)
 Eyepatch rectangular.....*dubia* Christiansen, 1960
5. Abd IV about 5 times length of III.....
 *dubia* Christiansen, 1960
 Abd IV about 3 times length of III.....
 *octopunctata* Börner, 1901
6. Abd IV about 6 times length of III.....
 *hirsuta* (Deboutteville, 1949)
 Abd IV about 4 times length of III.....7
7. Inner teeth of unguis small.....*gisini* Christiansen, 1960
 At least some inner teeth of unguis large.....
 *alba* (Packard, 1873)
8. Abd IV 6-7 times length of III.....9
 Abd IV 2.5-4 times length of III.....11
9. Dens with spines.....*spinosa* (Deboutteville, 1949)
 Dens without spines.....10
10. Ant IV more than 2 times length of I + II + III.....
 *boneti* Christiansen 1960

- Ant IV less than 2 times length of I + II + III.....
*hirsuta* (Deboutteville, 1949)
 11. Abd IV about 4 times length of III..*argentea* Folsom, 1902
 Abd IV about 3.5 times length of III.....
*petterseni* Börner, 1901
 Abd IV about 3 times length of III.....12
 Abd IV about 2.5 times length of III.....
*violenta* (Folsom, 1924)
 12. Basal mucronal spine present.....13
 Basal mucronal spine absent.....*espana* Christiansen, 1960
 13. Unguiculus with large outer tooth.....*folsoni* Denis, 1931
 Unguiculus with small outer tooth or none.....14
 14. Tenent hair capitate.....*rolfsi* Mills, 1932
 Tenent hair acuminate.....*orba* Christiansen, 1960

NOTE. Not included in the key is *P. subfusca* Wray, 1953.

Pseudosinella decemocolata (Guthrie, 1903)

NEW MEXICO RECORDS. From Berlese samples of dry yellow pine litter; 8,400 ft, Sandoval Co.; 25–viii–1953; and yellow pine-fir litter; 7,500 ft, San Miguel Co.; 6–vii–1953.

DISTRIBUTION. Minn., N. M., N. Y., Wash.

Pseudosinella petterseni Börner, 1901

NEW MEXICO RECORDS. Once under rocks, 4 times with ants, and 3 Berlese samples (oak, limber pine, cottonwood stump); 6,600 to 10,300 ft; Bernalillo, Dona Ana, Mora, Socorro, and Valencia Co., May–Nov., 1949–1954.

DISTRIBUTION. Ark., Calif., Conn., Ill., Ind., Iowa, La., Mass., Minn., Mo., N. M., N. Y., N. C., Tenn., Texas, Utah, Wash.; Ontario (Canada); South America, Europe, Asia.

NOTE. This species was recorded from New Mexico by Christiansen, 1960.

SUMMARY

Eight species of Entomobryinae (1 *Drepanocyrtus*, 2 *Willowsia*, 3 *Lepidocyrtus*, 2 *Pseudosinella*) are recorded from New Mexico. Of these, only *P. petterseni* has been reported previously from the state. Keys are presented to United States species of all 4 genera.

REFERENCES CITED

- CHRISTIANSEN, K. 1960. *Psyche* 67: 1-25.
FOLSOM, J. W. 1898. *Psyche* 8: 183-184 + 2 plates.
SANDERS, G. 1940. *Pests* 8: 20.
SCOTT, H. G., WISEMAN, J. S., AND STOJANOVICH, C. J. 1962. *Ann. Ent. Soc. America* 55: 428-430.
-

Review

GUIDE TO THE INSECTS OF CONNECTICUT. Part VI. The Diptera or True Flies of Connecticut. Eighth Fascicle. SCATOPSIDAE and HYPEROSCELIDAE by **Edwin F. Cook**, BLEPHAROCERIDAE and DEUTEROPHLEBIIDAE by **Charles P. Alexander**, DIXIDAE by **Wesley R. Nowell**. Pp. vi + 115, illus. Published by State Geological and Natural History Survey of Connecticut, Bull. No. 93, 1963. Distribution and exchange agent, Robert C. Sale, State Librarian, State Library, Hartford, Conn.

The treatment in each group is very broad and includes a general introduction, morphology of adult and immature stages, an account of the biology, and techniques for collection and study. Keys are provided for the subfamilies of the world, genera of North America, and species of the Northeastern region (Virginia to Labrador, westward to the Great Plains). Selected bibliographies are given and there is a foreword by the Entomological Editor for the Survey, Dr. Charles L. Remington, of Yale University.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) urgently required. Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

The Ants of Colorado

By **ROBERT E. GREGG, Ph.D.**

This book is the first comprehensive treatment of the ant fauna of Colorado, a section of the Rocky Mountains with tremendous diversity and complexity of topography and ecological circumstances which result in a rich fauna and flora and an outstanding number of species of ants.

1963

792 pages

\$14.00

Special Features

- First comprehensive treatment of ants of the Colorado Rocky Mountains.
- Provides complete orientation for students.
- A valuable source book for entomologists, ecologists, zoogeographers, and anyone working in practical agriculture.
- Discusses taxonomy and geographical distribution of 163 species and subspecies—some never before identified.
- Gives detailed account of ecology of ants.
- Based on collections from 500 localities and individual sites.
- Reviews the geological history and physiography of Colorado and major aspects of vegetation.
- Includes 26 tables, 24 plates, 163 species distribution maps, 163 species altitudinal charts, and one colored vegetation map.

Order from

UNIVERSITY OF COLORADO PRESS

Boulder, Colorado

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address:

**THE AMERICAN ENTOMOLOGICAL
SOCIETY**

1900 Race Street, Philadelphia 3, Pennsylvania

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

Ent,

Subscriptions for 1964 Are Now Due

Subscription Blank Enclosed

ENTOMOLOGICAL NEWS

NOVEMBER 1963

Vol. LXXIV

No. 9

CONTENTS

Evans—Prey and nesting behavior of some wasps	233
Walkley—A second reddish <i>Dusona</i> (Hym., Ichn.)	239
Scott—Collembola of New Mexico, XI	243
Gillaspy— <i>Stictiella corniculata</i> with synonymy	251
Lake—First instar <i>Aedes cantator</i> and <i>Ae. sollicitans</i>	253
Reviews: Ants of North Dakota; Practical Entomology	257
Notes and News: People and Pesticides	259

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

PRINCE AND LEMON STS., LANCASTER, PA.

AND

1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.

Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: **H. W. ALLEN**, **H. J. GRANT, JR.**, **M. E. PHILLIPS**, **J. A. G. REHN**, and **S. S. ROBACK**.

SUBSCRIPTIONS: Communications and remittances to be addressed to Entomological News, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder**, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXXIV

NOVEMBER, 1963

No. 9

Notes on the Prey and Nesting Behavior of some Solitary Wasps of Jackson Hole, Wyoming¹

HOWARD E. EVANS, Museum of Comparative Zoology,
Cambridge, Mass.

During the summer of 1961, I spent four weeks at the Jackson Hole Biological Research Station, Moran, Wyoming. Most of my time there was devoted to a study of two species of bembicine wasps. The results of this study will be published elsewhere as part of a general review of the behavior of this group. The present paper consists of brief notes made on several other species which were nesting at or near the station. These notes are all fragmentary, but for the most part they concern species which have previously been studied little if at all; in fact, one species has had to be described as new. Jackson Hole proved to be an exceedingly rich area for solitary wasps, and I hope to conduct further studies in this area.

The Jackson Hole station is located on the Snake River near the outlet of Jackson Lake, at an elevation of about 6750 feet. There are broad fields of grass and wildflowers on three sides of the station, broken with occasional groves of lodgepole pine. The soil in these fields is chiefly dark, alluvial, sandy gravel, varying from hard-packed to soft and friable in various places. Along the river there are several patches of pale, fine-grained sand. The wasps reported upon here nested chiefly in these small sandy areas or along sandy or gravel roads through the fields and pine groves.

¹ This study was supported by a grant from the National Science Foundation, no. G-17497.

I wish to express my thanks to the staff of the Jackson Hole Biological Research Station, particularly to Dr. L. Floyd Clarke, director, for the use of the excellent facilities of the station. I am also indebted to the authorities of Grand Teton National Park for granting me permission to collect specimens in connection with these studies. I am indebted to Karl V. Krombein for determining the *Niteloaterus*, to Frank D. Parker for determining the *Dryudella*, and to Arnold Menke for determining the *Podalonia* and the *Ammophila*. H. W. Levi determined the spiders, H. Ruckes the Hemiptera, and C. W. Sabrosky the flies. Other determinations were made by myself.

SPHECIDAE

Niteloaterus evansi Krombein

This very small wasp, undescribed until just recently (1963, ENT. NEWS 74: 61), was actually one of the commoner wasps in a small sand flat surrounded by pines, located about 20 meters from the banks of the Snake River and about 1 kilometer east of the station. On any sunny day in late July or early August a number of females could be seen walking over the sand carrying minute spiders to their nests. The spiders were carried forward over the ground very rapidly, the wasp grasping the spider in her mandibles by the leg-bases and holding it beneath her head. When she reached the nest entrance, which was always closed although often marked by a small mound of sand, the wasp would deposit the spider on the sand and dig open the entrance with her fore legs, then back in dragging the spider behind her. Although many females were observed, only two nests were dug out for study. Approximately seventy spiders were taken from these two nests, and several others were taken from provisioning females. All were very small, juvenile *Dictyna* sp. (Dictynidae). It is worth noting that spiders of this family are not known to be utilized as prey by North American spider wasps. They are mesh-web spinners, and according to Bristowe (1958, The World of Spiders, p. 87) they exhibit no appearance of fear of pompilid wasps, like that of other spiders, and in fact attack wasps readily when they enter their webs. *Niteloaterus evansi* would appear to be a specialist on these spiders.

In both the nests excavated, the burrow was oblique and at about a 35° angle with the flat surface of the sand. In one nest the burrow made an abrupt curve downward, while in the other there was a 90° lateral bend about halfway down. In one nest (my note no. 1772) the burrow was 9 cm long and terminated in an ovoid cell measuring about 4×5 mm and located 5 cm beneath the soil surface. This nest contained two additional cells, both about 3.5 cm deep and slightly beyond the first cell, separated by about 1.5 cm. These two cells both contained wasp larvae feeding on a mass of spiders. The cell still connected with the burrow contained twenty spiders, one of which bore an egg glued erect between the hind legs and the base of the abdomen (Fig. 1). There was also one additional spider in the burrow, 1 cm from the cell; presumably this spider would have been placed in the cell or might have served as the initial spider in a new cell yet to be prepared.

The second nest (no. 1792; Fig. 2) was marked on July 30 and dug out two days later, when it was still being actively provisioned. In this nest the burrow was only 5 cm long; there were six cells, all between 2.5 and 4 cm deep, separated from each other by 1.5–2 cm of soil. The cell connected directly to the burrow contained only five spiders and no egg, so it was obviously not fully provisioned. The two other most shallow cells appeared to contain only about six spiders each and no egg, but it is possible that some spiders and the eggs were lost in the excavation, as the cells and their contents were exceedingly small. The remaining three, deeper cells each contained about 10–12 spiders and an egg laid in the same manner as in the previous nest. Presumably the egg is laid on one of the topmost spiders after the cell is fully provisioned, but my notes are not entirely clear on this point.

One of the larvae from the first nest was reared to maturity and will be described elsewhere. When feeding, the larva lies on its back and holds the spider against its venter. Although no parasites were found in any of the cells excavated, several miltoigrammine flies were seen following provisioning females to their nests; in fact, as many as three flies would sometimes follow

a single wasp. One of these flies was captured and found to be *Senotainia* (*trilineata* Wulp complex).

Krombein and Kurczewski (1963, *Proc. Biol. Soc. Wash.*, in press) have recently published an excellent study of the Floridian *Nitelopterus slossonae* Ashmead. This species makes even shallower nests than *evansi* and provisions them with spiders of at least three families (not including Dictynidae). Prey carriage is not dissimilar to *evansi* and the nest entrance is closed as in that species; these authors also obtained evidence that the egg is not laid on the first spider placed in the cell. Their account contains much information on digging, orientation, hunting, closure, and prey carriage, covering many details which I was unable to study in *evansi*.

***Dryudella montana* (Cresson)**

This small wasp occurred in the same area as the preceding but was less common. Only one female was observed nesting. She was seen bringing immature stink-bugs to her nest about noon on July 30. The bugs were carried venter-up beneath her, the beak or antennae of the bug apparently being grasped by the wasp's mandibles. The nest entrance was closed and the bug was deposited on the ground while the wasp scraped it open; she reclosed the entrance upon leaving a few seconds later. The wasp was captured and the nest dug out at this point. The burrow entered the soil at about a 50° angle with the horizontal, and had one sharp curve before terminating in a slight enlargement at a depth of 4 cm. In this enlargement were several bugs piled in irregularly, none of them bearing an egg. I judged, from what is known of the related genus *Astata*, that this was merely a storage cell that the true cells would be prepared deeper in the soil and stocked from the bugs in storage. I was unable to find any cells, so assumed that this was a new nest which contained only the storage cell. The bugs were all rather small nymphs; one was a reduviid of the genus *Zelus* or *Pselliopus*, two were scutellerids of the genus *Eurygaster*, and the remaining four were cydnids, *Corimelaena montana* Van D.

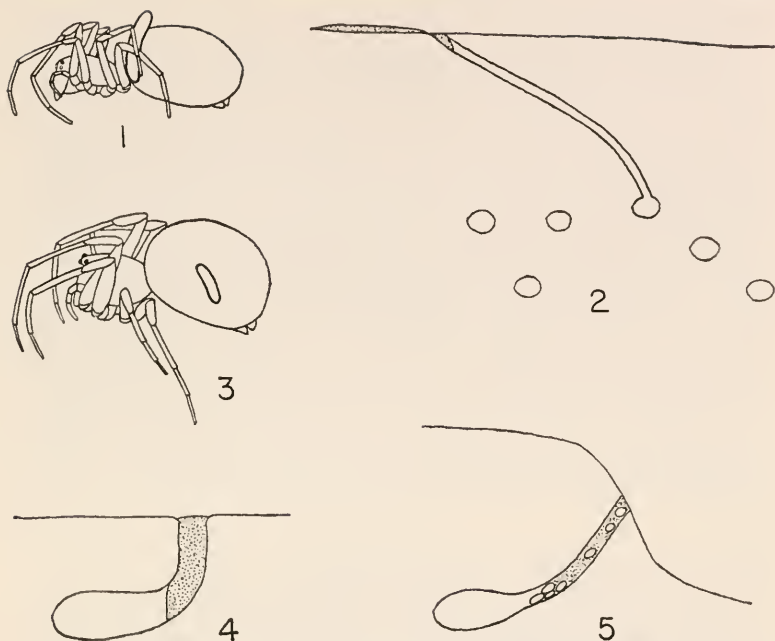


FIG. 1. *Dictyna* sp. bearing the egg of *Nitelopterus evansi*. FIG. 2. Profile of nest of *N. evansi*. FIG. 3. *Araneus* sp. bearing the egg of *Episyron q. quinquenotatus*. FIG. 4. Profile of nest of *Podalonia robusta*. FIG. 5. Profile of nest of *Aumophila pilosa*.

***Podalonia robusta* (Cresson)**

This wasp was very common in Jackson Hole. Mating pairs were seen on several occasions on *Solidago* and other flowers. One female was seen closing her nest in a dirt road at 1635 on August 1 (note no. 1791). She scraped in sand with her front legs and packed it in place with her head. This nest was found to be very shallow, the burrow vertical and only 1.5 cm long, leading to a horizontal cell 2.5 cm long (Fig. 4). The cell contained a single cutworm (Noctuidae), head-in and very slightly coiled, bearing an egg on the upper side on the third abdominal segment, above the first pair of prolegs. The prey and egg were placed in a rearing tin. The egg hatched on August 4, and the larva reached full size on August 12. The full-grown larva will be described elsewhere.

***Ammophila pilosa* (Fernald)**

A female of this species was seen closing her nest along the edge of a dirt path near the south entrance of Yellowstone National Park on July 31 (no. 1785). She picked up small pebbles and placed them in the burrow, then scraped sand over them. I did not wait to see the complete closure, as a storm was threatening. The nest was dug out a few hours later and found to contain a wasp larva 12 mm long (probably about three days old), along with seven caterpillars, one a noctuid, one a geometer, the other five *Lycaenidae*. The burrow was oblique, 7 cm long (including the cell), the cell slightly oblique, its deepest end 5 cm beneath the surface (Fig. 5). These brief notes indicate that provisioning is progressive in this species, as in *harti*, or at least "delayed," as in *aberti* and some other species (Evans, 1959, *Amer. Midl. Nat.* 62: 449-473).

POMPILIDAE

***Episyrion quinquenotatus quinquenotatus* (Say)**

The nesting behavior of this common psammophile is well known (Evans and Yoshimoto, 1962, *Misc. Publ. Ent. Soc. Amer.* 3: 91). At Jackson Hole females were commonly seen nesting in the sides of small mounds of sand or dark sandy loam not far from the Snake River; the soil at the entrance of gopher holes was especially favored. One nest which was dug out was found to be a simple, straight burrow 7 cm long, terminating in a cell 5 cm beneath the surface. The spider is typically hung on a plant nearby while the nest is being excavated. The wasp carries the spider by grasping the base of the hind legs and walking backward; she may also fly short distances with the spider dangling from her mandibles. The egg is laid obliquely on the side of the abdomen of the spider (Fig. 3). The entire nesting process, from the capture of the spider to the closure of the nest, may take no more than a little over an hour.

Five spiders were taken from various females at Jackson Hole. One was a female *Araneus patagiatius* Clerck, another a juvenile of this same species, while the other three were iden-

tified simply as juvenile *Araneus* sp. Another female *q. quinquenotatus* was taken on August 19 at Cornish, Utah, with a juvenile *Araneus* sp. (all Araneidae).

***Pompilus angularis* (Banks)**

This small wasp was also common in sandy patches along the Snake River. One female was taken as she dragged a spider backward, grasping it near the base of the hind legs in the manner common to many Pompilidae. The spider was a juvenile salticid. Two more female *angularis* were taken in late August at Great Sand Dunes National Monument, Alamosa Co., Colorado, at 8,000 feet elevation. Both were carrying their spiders backward in the same manner; one of them deposited her spider on the ground while she explored ahead. The spiders were both juvenile Salticidae, probably of the genus *Habronattus*.

***Pompilus occidentalis* (Dreisbach)**

I took a female of this species dragging a spider backward in the same manner as *angularis*. The site was a gravel bank along the Snake River just south of the south gate of Yellowstone National Park. The spider was identified as a female *Pardosa uintana* Gertsch. Powell (1957, *Pan-Pac. Ent.* 33: 39-40) found *occidentalis* preying upon a species of *Pardosa* in California.

A Second Reddish *DUSONA* from the Nearctic Region (Hymenoptera: Ichneumonidae)

LUELLA M. WALKLEY, Entomology Research Division, Agric.
Res. Serv., U. S. Department of Agriculture

G. Stuart Walley, in his 1940 revision of *Campoplegidea* Viereck, described a new species, *pallescens*, from a single female taken in Georgia. *Campoplegidea* Viereck was later considered to be a synonym of *Dusona* Cameron (Townes, 1951). The species *pallescens* has since been found in Tennes-

see, South Carolina, and Florida. Walley, in his revision, included only this species in Group XVI, the distinctive characters of which were "unusually narrow malar and ocellocular spaces, strongly post-furcal nervulus, narrow post-petiole and slender, rather elongate sheath." He also noted that it could be distinguished from all other species of the genus treated in his revision "by the absence of any black on head or thorax," and by "the entire body being a light reddish-brown." The new species described below from four females, in comparison with *Dusona pallescens*, possesses all of the above group characters in greater or lesser degree.

***Dusona ferruginea*, new species (Fig. 1)**

Holotype ♀: Length, 12 mm; forewing, 6.9 mm; ovipositor sheath, 0.7 mm; proportion of face length to breadth as 9.5 to 7.5.

Distinguished most easily from all other described Nearctic species, except *pallescens*, by the entirely rusty-red body, and differing from *pallescens* in having the marginal carina of the mesonotum more decidedly blackish and the femora of the middle and hind legs largely blackish. It differs further from *pallescens* in having:

(1) The occipital carina meeting the hypostomal carina a little beyond the base of the mandible (Fig. 1A), the two carinae forming a plate that extends beyond the basal explanate margin of the mandible; (2) the claws more strongly bent with the pectination distinctly basad of the middle, the teeth proportionately finer and more closely spaced (in *pallescens* the pectination is coarser and extends distinctly beyond the middle); (3) the wings yellowish and apically more infumate, with stigma and first abscissa of radius paler than the remaining veins (in *pallescens* both the stigma, except paler dorsal margin, and veins are brownish), with nervulus postfurcal by only a little more than one-half its length; (4) antennae stouter and concolorous with body in basal half, gradually paler toward apex with two or three apical segments sometimes a little infusate;

(5) mesoscutum more finely punctate and scutellum distinctly shining with shallow, scattered punctures; (6) posterior corner of proepisternum bending at a right angle and extending posteriorly nearly one-third the proepisternal length, and with a transverse plate-like or explanate carina at the bend (Fig. 1B), a more or less distinct median carina extending from explanate carina to apex (in *pallescens* transverse carina is not explanate and the median carina is absent).

FIG. 1

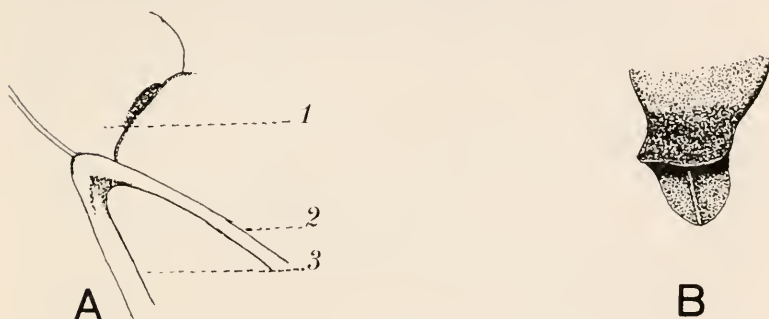


FIG. 1: A (75 $\times$). Union of occipital and hypostomal carinae; 1 = mandible, 2 = occipital carina, 3 = hypostomal carina. B (40 $\times$). Posterior apex of proepisternum.

Holotype and three paratype females, U. S. National Museum Type No. 66804. Holotype collection data as follows: Ross and Castello Hammock, Dade County, Florida, H. V. Weems, Jr., coll. April 11, 1959. Paratypes: Same except April 7, 1959 date. Holotype and one paratype in U. S. National Museum Collection; two paratypes in collection of the Florida State Plant Board, Gainesville, Florida. Variation in the four specimens is slight. Median carina of proepisternal apex less distinct anteriorly in smaller specimen. Scutellum distinctly yellow and shining in paratypes. Reddish scutellum of type specimen is probably discoloration by killing agent.

Walley's key to the species of (*Campoplegidea*) = *Dusona* may be amended as follows to include *ferruginea*:

68. Head never black, body entirely reddish or yellowish brown with paler markings and sometimes margin of mesoscutum blackish.....68a
 Head uniformly black; thorax and propodeum varying from entirely black to largely reddish but in latter case always with conspicuous black markings.....69
 68a Median area of propodeum not at all infusate apically; wings faintly tinged with brown, darker apically; outer side of scape and pedicel, all of flagellum dark brown or blackish.....*pallescents* (Walley)
 Median area of propodeum infusate apically; wings with distinct yellowish tinge, dusky apically; scape, pedicel, and basal half of antenna more evenly reddish brown, then gradually paling toward apex with apical two or three segments more or less infusate.....
*ferruginea*, new species

Two specimens of *pallescents* from Florida differ from the type specimen as follows: Body color more brownish, antennae darker, wings more dusky, margin of mesoscutum slightly darker, size 10 mm and 12 mm, respectively (type 10 mm); occipital carina uniting with hypostomal carina at base of mandible or apparently so in one specimen.

It should be noted here that the median furrow of the propodeum is deeper in *pallescents* than in *ferruginea* and in the three *pallescents* specimens I have seen, the furrow is crossed by several distinct carinae; in *ferruginea* the furrow is more rugosely sculptured without distinct carinae transversing it.

BIBLIOGRAPHY

- SMITH, L. K., and R. SHENEFELT. 1955. A guide to the subfamilies and tribes of the family Ichneumonidae (Hymenoptera) known to occur in Wisconsin. Wis. Acad. Sci., Arts, and Letters 44: 165-219 (including plates I-X).
- SNODGRASS, R. E. 1910. The thorax of Hymenoptera. Proc. U. S. Nat'l Mus. 39: 37-91; pl. 1-16 (proepisternum).
- . 1935. Principles of insect morphology. McGraw-Hill Book Co. 667 pp.
- TOWNES, H. K., and M. TOWNES. 1951. In Muesebeck, *et al.* Hymenoptera of America north of Mexico. Synoptic Catalog. U. S. Dept. Agr. Monog. No. 2, pp. 370-375.
- WALLEY, G. S. 1940. A revision of the ichneumon-flies of the genus *Campoplegidea* occurring in America north of Mexico. Sci. Agr. 20: 647-734.

The Collembola of New Mexico. XI. Entomobrya, Orchesella, Lepidocyrtinus^{1, 2}

HAROLD GEORGE SCOTT³

None of the 15 species reported herein has previously been recorded from New Mexico. Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Genus ENTOMOBRYA Rondani, 1861

Body elongate, not subglobose; scales absent; antennal segments 4, distal segments not annulate; eyes 8 and 8, on dark eyepatches; prothorax naked dorsally, greatly reduced; Abd IV more than twice length of III; dentes dorsally crenulate, with setae ventrally; mucro with 2 teeth and 1 basal spine.

KEY TO SPECIES OF NEARCTIC ENTOMOBRYA

1. Body densely setate.....**brunniecapilla** Maynard, 1951
Body thinly setate.....2
2. Antenna with apical retractile bulb.....3
Antenna without apical retractile bulb.....
.....**sinelloides** Christiansen, 1959
3. Abd IV with flat setae.....**kincaidi** Folsom, 1902
Abd IV with only round setae.....4
4. Head much longer than wide.....5
Head, at most, only slightly longer than wide.....9
5. External labial seta long.....6
External labial seta short.....21
6. Mesonotum produced over head....**bicolor** Guthrie, 1903
Mesonotum not produced over head.....7
7. Head mostly dark.....**nigriceps** Mills, 1932
Head mostly pale.....8
8. Abd II with 2 diagonal stripes, often broken.....
.....**decemfasciata** (Packard, 1873)
Abd II with 4 longitudinal stripes.....
.....**quadrilineata** Bueker, 1939

¹ A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico, Albuquerque, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

² Part X appeared in ENT. NEWS 74 (8): 225-231.

³ Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta 22, Georgia.

9. Ant III sense organ with 4 rods.....*troglodytes* Christiansen, 1959
Ant III sense organ with 2-3 rods.....10
10. Most setae of male genital plate sickle-shaped.....11
Most setae of male genital plate straight.....13
11. With broad abdominal stripes....*clitellaria* Guthrie, 1903
With irregular abdominal stripes or spots.....12
12. Differentiated labial setae long (see Christiansen, 1959,
p. 476).....*comparata* Folsom, 1919
and *lateropicta* Hammer, 1953
Differentiated labial setae short.....*ligata* Folsom, 1924
13. Compressed dorsoventrally.....*assuta* Folsom, 1924
Not compressed dorsoventrally.....14
14. Labral papillae multisetaceous.....15
Labral papillae unisetaceous.....17
15. Body unicolorous.....*griseolivata* (Packard, 1873)
Body patterned.....16
16. Abd V and VI dark marked.....*nivalis* (Linnaeus, 1758)
Abd V and VI not dark marked....*atrocincta* Schott, 1896
17. With mid-dorsal stripe.....*unostrigata* Stach, 1930
Without mid-dorsal stripe.....18
18. All setae of male genital plate pointed.....19
Some setae of male genital plate blunt.....20
19. Body patterned.....*suzannae* Scott, 1937
Body unicolorous.....*confusa* Christiansen, 1959
20. Abd IV with longitudinal stripes.....
.....*washingtonia* Mills, 1935
Abd IV with transverse stripes...*triangularis* Schott, 1896
21. Antenna longer than body.....*arnaudi* Wray, 1953
Antenna shorter than body.....*gisini* Christiansen, 1959

NOTE. Not included in key are *E. cavicola* Banks, 1897; *E. duolincata* Bueker, 1939, or *E. pygmaea* Harvey, 1895.

DISCUSSION. The generic name *Entomobrya* is stabilized by International Commission on Zoological Nomenclature (Opinion 440, 8 Jan 1957).

Christiansen, 1959, reports *Entomobrya arnaudi* Wray, 1953, from Grant Co., New Mexico and *E. comparata* Folsom, 1919 from Santa Fe, New Mexico. These are the only species of *Entomobrya* recorded from the state prior to this report.

In the New Mexico study, this genus was the most frequently collected of the Collembola. The number of collections made of the various species is:

<i>Entomobrya griseolivata</i>	78 collections
<i>Entomobrya assuta</i>	69 collections
<i>Entomobrya nivalis</i>	28 collections
<i>Entomobrya atrocincta</i>	26 collections
<i>Entomobrya brunniecapilla</i>	8 collections
<i>Entomobrya corticalis</i>	1 collection
<i>Entomobrya triangularis</i>	1 collection

Entomobrya assuta Folsom, 1924

NEW MEXICO RECORDS. From ant nest, beneath rocks, sifting yellow pine, 9 collections from beneath bark (spruce, fir, yellow pine, limber pine), 28 sweeping collections (spruce, fir, yellow pine, alligator-bark juniper, alder, Gambel oak, *Atriplex canescens*) and 29 Berlese samples of litter (yellow pine, juniper, Gambel oak, spruce, spruce-fir, aspen-fir, oak-pinon, birch, limber pine, yellow pine-fir, aspen-spruce-fir, alder-fir, Gambel oak-yellow pine, cottonwood, aspen, alder, sycamore-walnut); 5,300 to 12,300 ft; Torrance, Catron, Socorro, Lincoln, Rio Arriba, Taos, Sandoval, Los Alamos, Santa Fe, Mora, San Miguel, Valencia, Grant and Bernalillo Co.; May-Sep 1950-54.

DISTRIBUTION. Ill., Iowa, Kan., La., Me., Mass., Miss., Mo., N. M., N. Y., N. C., S. C., Tex., Utah, Vt.; Ontario (Canada).

Entomobrya atrocincta Schott, 1896

NEW MEXICO RECORDS. From ant nest, dried powdered milk, searching grass clumps and sod, sifting pinon and yellow pine litter, and 21 Berlese samples of litter (juniper, cottonwood, pinon, alder, grass roots, yucca roots, limber pine, sycamore-walnut, yellow pine-Gambel oak, oak-juniper, spruce-fir, fir log and yellow pine log); 4,100 to 12,300 ft; Bernalillo, Catron, Chaves, Rio Arriba, San Miguel, Santa Fe, Socorro, Taos, Torrance, and Valencia Co.; Jan, Mar, Jun-Oct 1951-54.

DISTRIBUTION. Cal., Conn., Ida., Iowa, Kan., Md., Mass., Minn., Mo., N. M., N. Y., Ore., Pa., Tenn., Tex., Utah, Vt., Wash.; Ontario (Canada); Central America, South America; Europe; Australasia.

Entomobrya brunniecapilla Maynard, 1951

NEW MEXICO RECORDS. From under rocks (2 collections), beneath limber pine bark, and 5 Berlese samples of litter (acorn hulls, aspen-spruce-fir, oak, pinon, scrub oak); 5,300 to 11,600 ft; Bernalillo, San Miguel, Socorro, and Taos Co.; Jul-Sep 1951, 53-54.

DISTRIBUTION. N. M., N. Y.

Entomobrya corticalis (Nicolet, 1841)

NEW MEXICO RECORD. Berlese sample of rodent midden; 11,200 ft; Taos Co.; Sep 1953.

DISTRIBUTION. Md., N. M., N. Y., N. C., Pa.; South America; Europe; Asia.

Entomobrya griseolivata (Packard, 1873) (= *E. marginata*)

NEW MEXICO RECORDS. From under rocks (5 collections); ant nests (2 collections); rodent midden (1 collection); logs (13 collections from fir, yellow pine, aspen, limber pine); and 57 Berlese samples of litter (Gambel oak, oak, aspen-fir, yellow pine, aspen, cottonwood, spruce, alder, Gambel oak-yellow pine, pinon, aspen-spruce-fir, grass clumps, birch, sycamore-walnut, juniper, oak-pinon, limber pine, aspen-maple, aspen-spruce, alder-fir, pine, yucca); 5,000 to 12,300 ft; Rio Arriba, Taos, McKinley, Sandoval, Los Alamos, Santa Fe, Mora, San Miguel, Valencia, Bernalillo, Torrance, Catron, Socorro, and Lincoln Co.; May-Nov 1950-54.

DISTRIBUTION. Cal., Colo., Conn., Ida., Ill., Iowa, Mass., Me., N. M., N. Y., Ohio, Pa., Tenn., Utah, Wash.; Ontario (Canada); Europe; Australasia.

Entomobrya nivalis (Linnaeus, 1758) (= *E. multifasciata*)

NEW MEXICO RECORDS. From under rocks, logs (spruce, fir, aspen, cottonwood); sweeping (spruce, Gambel oak, fir, alder), and 18 Berlese samples of litter (cottonwood, pinon, yellow pine, Gambel oak, oak, juniper, boxelder, alder, pinon-juniper, bristlecone pine-spruce); 4,100 to 11,700 ft; Rio Arriba, Taos, Colfax, Sandoval, Santa Fe, Mora, San Miguel, Valencia, Bernalillo, Catron, Socorro, and Dona Ana Co.; Feb, Apr-Nov 1949-54.

DISTRIBUTION. Ariz., Cal., Colo., Conn., Del., Haw., Ida., Ill., Iowa, Kan., Ky., Me., Md., Mass., Mich., Minn., Mo., Mont., N. H., N. J., N. M., N. Y., N. C., Ore., Pa., Tenn., Tex., Utah, Va., Vt., Wash.; Northwest Territories and Ontario (Canada); Iceland; Europe; Africa; Australasia.

Entomobrya triangularis Schott, 1896

NEW MEXICO RECORDS. From beneath dung in pinon-juniper area, 6,800 ft. Torrance Co., Sep 1954.

DISTRIBUTION. Cal., N. M., N. Y., Ore., Tex., Wash.; British Columbia (Canada); South America.

Genus **ORCHESELLA** Templeton, 1835

Body elongate, segmented; scales absent; antenna 6-segmented, segments never annulate; eyes 8 and 8; prothorax reduced; Abd IV much longer than III; mucro with 1 tooth.

KEY TO SPECIES OF NEARCTIC ORCHESELLA

1. Body white except dark eyepatches and front.....2
Body with dark markings.....3
2. Unguis toothed.....**albosa**, f. p., Guthrie, 1903
Unguis untoothed.....**pallens** Maynard, 1951
3. Body nearly uniformly dark.....4
Body striped.....5
4. Th II with pale area dorsally.....
.....**cincta** (Linnaeus, 1758) f. **vaga** (Linnaeus, 1767)
Th II without pale area dorsally.....**folsomi** Maynard, 1932
5. With longitudinal stripes only.....6
With transverse stripes only.....7
With transverse and longitudinal stripes.....
.....**albosa** (Guthrie, 1903) f. **ainsliei** Folsom, 1924
6. One dorsal stripe.....**rubra** sp. nov.
Two dorsal stripes.....**flavescens** (Bourlet, 1839)
Three dorsal stripes.....**zebra** Guthrie, 1903
7. Stripes narrow.....**annulicornis** Mills, 1934
Stripes broad.....8
8. One transverse stripe.....**cincta** f. p. (Linnaeus, 1758)
Seven transverse stripes.....**hexfasciata** (Harvey, 1896)

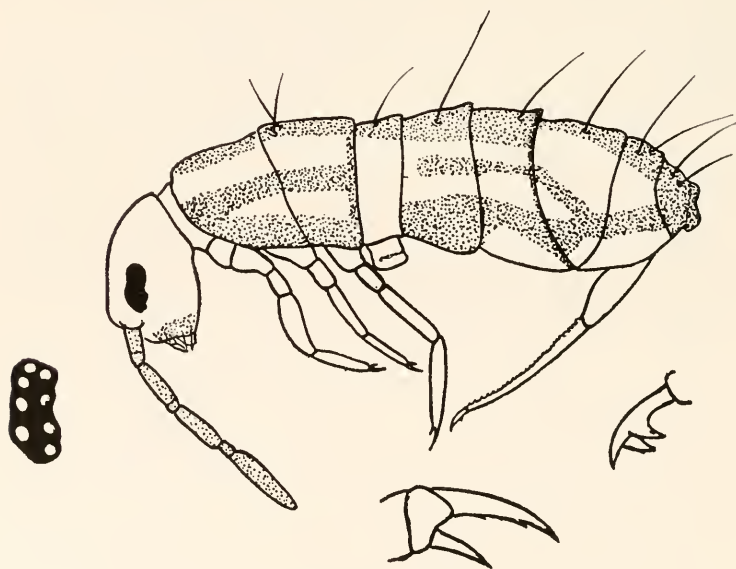
NOTE. Not included in the key is **carneiceps** (Packard, 1873).

Orchesella albosa Guthrie, 1903

DISCUSSION. The New Mexico specimens show clearly that *Orchesella ainsliei* Folsom, 1924, and *O. albosa* Guthrie, 1903, are conspecific. Long series from several different collections show nearly every intergrade between the almost white *O. albosa* and the heavily marked *O. ainsliei*. Consequently, the well-known name *O. ainsliei* is made synonymous with *O. albosa*. This species is reported infesting man (see Scott, et al., 1962).

NEW MEXICO RECORDS. From beneath aspen bark, wood, yellow pine logs (1 collection each), and rocks (4 collections); and 5 Berlese samples of litter (aspen, cottonwood, grass-herb clumps, spruce, and spruce-willow-mountain cottonwood-alder); 7,800 to 13,000 ft; Taos, Colfax, Santa Fe, Mora, Valencia, Bernalillo, and Socorro Co.; Jun-Jul, Nov 1952-54.

DISTRIBUTION. Ill., Iowa, La., Mass., Minn., N. M., N. Y., N. C., Pa., Tenn., Tex.; Ontario (Canada).



Orchesella rubra, sp. nov.

***Orchesella cincta* (Linnaeus, 1758)**

NEW MEXICO RECORDS. From beneath rocks (3 collections); with ants (2 collections); sifting Gambel oak litter; and 2 Berlese samples of aspen-fir litter; 7,500 to 11,400 ft; Taos, Santa Fe, San Miguel, Valencia, and Bernalillo Co.; Jun-Jul 1953-54.

DISTRIBUTION. Ida., Mass., N. M., N. Y.; Newfoundland, Northwest Territories and Ontario (Canada); Iceland; Europe; Asia.

***Orchesella folsomi* Maynard, 1933**

DISCUSSION. Some of the New Mexico specimens have the metathorax purple. Consequently, I expand Maynard's description to include this variation.

NEW MEXICO RECORDS. From beneath rocks; and Berlese sample of herb-grass soil and roots; 12,300 ft; Taos Co.; Sep 1954.

DISTRIBUTION. N.M., N.Y.; Ontario (Canada).

***Orchesella hexfasciata* Harvey, 1896**

NEW MEXICO RECORDS. From beneath rocks (4 collections); beneath aspen branches; with ants (3 collections); sweeping Engelmann spruce; and 10 Berlese samples (oak, grass clumps, aspen, fir, fir-aspen, juniper, spruce, yellow pine); 7,400 to 12,200 ft; Rio Arriba, Taos, Sandoval, Santa Fe, San Miguel, Bernalillo, and Socorro Co.; May, Jul-Oct 1950-53.

DISTRIBUTION. Conn., Ill., Iowa, La., Me., Mass., N. H., N. M., N. Y., N. C., Pa., Va., Wisc.; Ontario (Canada); Africa.

***Orchesella pallens* Maynard, 1951**

NEW MEXICO RECORDS. From beneath rocks, and 2 Berlese samples (alder and yellow pine-spruce-fir); 8,400 to 11,900 ft; Mora, Taos, and San Miguel Co.; Jul and Sep 1953-54.

DISTRIBUTION. N. M., N. Y.

Orchesella rubra, sp. nov. Figure 1

TYPE LOCALITY. Columbine Camp, west of Red River Village, Taos Co., NEW MEXICO. The type specimens were taken from a field Berlese sample of thick birch litter, 8,000 feet elevation, 19 Aug 1953.

DESCRIPTION. Body elongate, not subglobose; segmentation distinct, abdominal segments not ankylosed; integument smooth; scales absent; red with 5 irregular longitudinal black stripes, 2 along each side and 1 middorsal; clothed by long and medium long setae; head prognathous; antenna to head as 3:2; antennal segments as 20:2:25:5:27:7:45; eyes eight and eight on dark eyepatches; mouthparts chewing; body segments as 12:10/7:8:9:10:5:5; prothorax reduced, almost entirely hidden by mesothorax; tibiotarsus without distal subsegment; claws tunicate; unguiculus to unguis as 5:2; tenent haris absent; unguis with 2 teeth; unguiculus without teeth; furcula reaching beyond colophore; dental spines absent; dentes dorsally crenulate; mucro with 2 teeth, non-lamellate; anus terminal; anal spines absent; length 1.3 mm.

DISCUSSION. Members of the genus *Orchesella* normally have six antennal segments. This attractive species has seven, the extra one seeming to be the sixth.

DISTRIBUTION. N. M.

Orchesella zebra Guthrie, 1903

NEW MEXICO RECORDS. Sweeping grass, and Berlese sample of tree root (yellow pine or fir); 7,500 and 8,500 ft; Taos and San Miguel Co.; Jul 1953.

DISTRIBUTION. Minn., N. M.

Genus **LEPIDOCYRTINUS** Börner, 1903

Body elongate, segmented; scales present; eyes 8 and 8 on dark eyepatches; antenna 4 segmented; Ant IV annulate; prothorax naked, greatly reduced; Abd IV more than twice III; dentes dorsally crenulate, without large fringed scales; mucro falcate with 1 basal spine.

DISCUSSION. Only one species of this genus is known from North America.

Lepidocyrtinus domesticus (Nicolet, 1841) (= *L. trouessarti* of some authors, see Salmon, 1945)

NEW MEXICO RECORD. Sweeping grass, 10,000 ft; Lincoln Co.; Jun 1952.

DISTRIBUTION. N. M., N. Y.; South America; Europe; Australasia.

SUMMARY

Seven species of *Entomobrya*, six of *Orchesella* and one of *Lepidocyrtinus* are recorded from New Mexico. In addition, *O. rubra* sp. nov. is described. All are new records for the state. Keys to Nearctic *Entomobrya* and *Orchesella* are presented.

REFERENCES

- CHRISTIANSEN, K., 1959. Bull. Mus. Comp. Zool. Harvard 118: 437-545.
SALMON, J. T., 1945. Trans. Royal Soc. New Zealand 75: 68-71.
SCOTT, H. G., J. S. WISEMAN, and C. J. STOJANOVICH, 1962. Ann. Ent. Soc. America 55: 428-430.

The Identity of *Stictiella corniculata* Mickel (Sphecidae: Bembicini), with a Note on Synonymy in *Stictiella*

JAMES E. GILLASPY, Mankato State College,
Mankato, Minnesota.

In his generic revision of 1929 (*Proc. U.S.N.M.* 75(5): 1-203), Parker did not include a species, *Stictiella corniculata* Mickel, described in 1918 (1917) in *Neb. Univ. Stud.* 17: 332. I have seen a total of eighteen males and eight females of this species, originally described on the basis of a single male from Worland, Wyoming. Those I have seen are as follows: NEVADA.—HUMBOLDT Co.: Winnemucca, Dunes 10 mi. N of, 4♂, 1♀, 17.IX.58 (E. R. Tinkham). WASHOE Co.: Nixon, 3 mi. N of, 11♂, 4♀, 9.IX.60 (A. S. Menke, University of

California at Davis; 2♀, same data except 5 mi. W of Nixon; Vya, ♂, 19.VII.27 (H. E. Guerlac, Cornell University). WHITE PINE Co.: Charcoal Ovens, ♂, 8.VII.60 (T. R. Haig, University of California at Davis). CALIFORNIA.—INYO Co.: Big Pine, ♂, 24.VIII.60 (M. E. Irwin, University of California at Davis); Lone Pine, 1.5 mi. S, 1♂, 1♀, *Chrysothamnus nauseosus* ssp. *consimilis*, 9.IX.56 (P. D. Hurd, California Insect Survey).

This species is a member of *Stictiella* in the narrow sense defined by Gillaspay, Evans and Lin in 1962 (*Ann. Ent. Soc. Amer.* 55: 563). The males are at once distinguishable from others of the genus by the hind femur, which is distinctly curved through almost all its length. The females run to *pulchella* (of Parker, not Cresson) in Parker's key, as do also those of *tuberculata* (Fox), but are separable by having the clypeus proportionately wider, being more than two times wider than its median length in *corniculata*, but two times or less in the others. In addition tibia III of *corniculata* lacks the posterior, longitudinal black stripe that is present in *pulchella* as defined by Parker, not Cresson. It should be noted here that I have examined the type of *pulchella* and find that it has discal and posterior scutal maculae and other features set forth by Parker for *melanosterna*, which should fall as a synonym, *pulchella* (Cresson) (= *melanosterna* Parker). Thus *pulchella* is applicable to the form with extensive yellow maculation and no posterior longitudinal black stripe of tibia III in the female, while a new name, *Stictiella nubilosa* Gillaspay, is proposed for the other (= *pulchella*: Parker, not Cresson), which has extensive black and the maculation usually in large part white. Hereby designated as holotype of *nubilosa* is a female in the United States National Museum collection, a part of Parker's series of "*pulchella*," bearing the following labels: 77; 313; Los Angeles Co. Cal.; Collection Coquillett.

(This study part of NSF-G 17497.)

Descriptions of First-Instar Larvae of *Aedes cantator* (Coquillett) and *Aedes sollicitans* (Walker) ¹

ROBERT W. LAKE ²

Only four comparative works dealing with first-instar *Aedes* larvae are available at the present time. Bohart (1954) and Price (1960), describe and present figures of 14 *Aedes* species from California and 19 *Aedes* species from Minnesota respectively. Of these, Bohart includes five Delaware species and Price nine. Marshall (1938) describes and presents figures of 11 species of British *Aedes*, three of which occur in Delaware. Dodge (1945) in an unpublished Doctoral Dissertation, dealing with first-instar mosquito larvae of the United States, discusses 17 species of North American *Aedes*; 12 of these occur in Delaware. Of the 19 species of aedine mosquitoes present in Delaware, descriptions of only 10 species of first-instar larvae appear in the literature. The descriptions of five additional species appear in Dodge's unpublished work mentioned above.

With new descriptions, presented in this paper, of the first-instar larvae of *A. cantator* (Coquillett) and *A. sollicitans* (Walker) accompanied by the four comparative works mentioned above, there remain only two species *A. grossbecki* Dyar and Knab and *A. aurifer* (Coquillett) to be described for Delaware. However, it was felt that *Aedes* material should be collected for all of the Delaware species and compared with the existing descriptions before an attempt is made to present a key to this important genus of mosquitoes.

In Delaware, *A. cantator* and *A. sollicitans* are found frequently in the same type habitat. These two species now may be separated in the first larval instar by the descriptions that follow, especially by differences in the pecten teeth, length of antennal hair 4, and the relative length of the dorsal preapical bristle and the apical pecten tooth.

¹ Published as Miscellaneous Paper No. 445 with the approval of the Director of the Delaware Agricultural Experiment Station. Publication No. 335 and Scientific Article 351 of the Department of Entomology.

² Research Associate, Department of Entomology, University of Delaware.

PROCEDURE

Adult females of both species were collected in the field and provided with a blood meal either in the field or upon returning to the laboratory. They were caged and allowed to oviposit on mud or peat pads which first had been wrapped in muslin and covered with cheesecloth, similar to the method employed by Haeger (1958) for *A. taeniorhynchus*.

After a short period of conditioning at room temperature, which permitted embryonic development, the egg samples were immersed in a nutrient broth media, except in the case of *A. sollicitans* where some of the eggs were placed in a 5000 ppm saline solution.

Larvae were killed in hot water, preserved in alcohol, cleared in beechwood creosote, and mounted, in the manner described by Price (1960). Some of the larvae were killed within eight hours after emergence; others as much as 24 hours after emergence. The extent of primary and secondary sclerotization, of the siphon, was more evident in late first-instar larvae.

For details concerning the manner of description and measurements utilized, the reader is referred to Price (1960) whose methods were followed closely.

It was not considered necessary to label all parts in both drawings since Fig. 1 can be compared readily to Fig. 2 where all necessary diagnostic structures are identified.

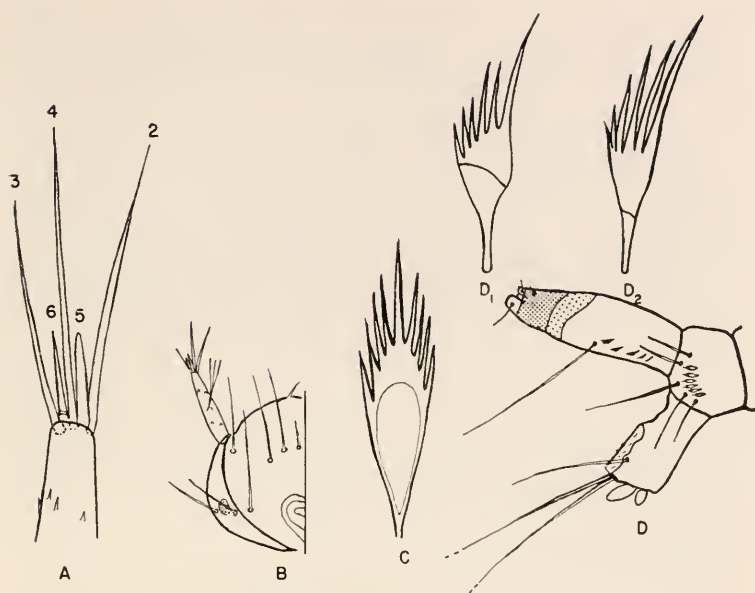
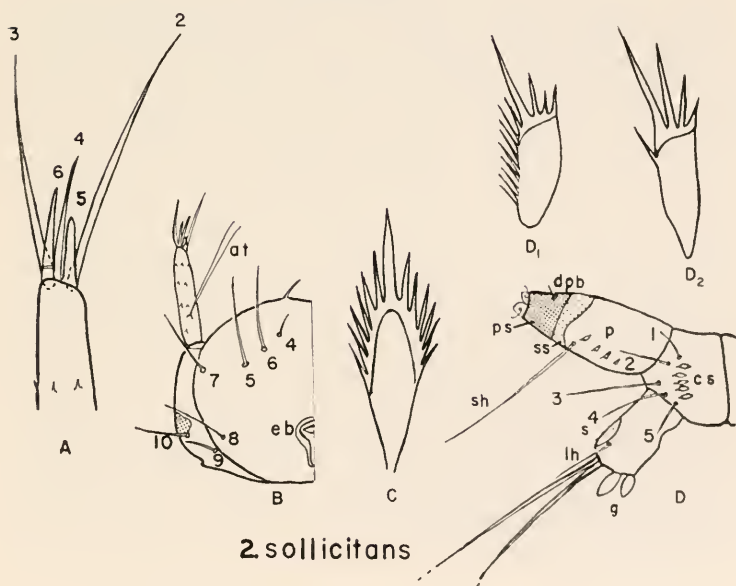
***Aedes cantator* (Coquillett) (Fig. 1)**

Head: Hairs single, postclypeal distinctly posterior to a line drawn through base of upper and lower head hairs on same side.

FIGURES 1-2. *Aedes cantator* and *A. sollicitans* first-instar larvae.

FIG. 1. A. Terminal portion of antenna: 2, inner subapical hair; 3, outer subapical hair; 4, dorsal median terminal hair; 5, hyaline process; 6, dorsal external finger process. B. Head-dorsal side, left half. C. Comb scale. D. Terminal segments. D₁ Distal pecten tooth. D₂ Penultimate pecten tooth.

FIG. 2. A. Terminal portion of antenna. B. Head—*at*, antennal tuft; *eb*, egg burster; 4, postclypeal hair; 5, upper head hair; 6, lower head hair; 7, preantennal hair; 8, sutural hair; 9, transsutural hair; 10, supra-orbital hair. C. Comb scale. D. Terminal segments—*dpb*, dorsal pre-apical bristle; *cs*, comb scale; *g*, anal gills; *lh*, lateral hair; *ps*, primary sclerotized ring; *s*, saddle; *sh*, siphon hair; *ss*, secondary sclerotized ring; *I-5* pentad hairs; D₁ Distal pecten tooth; D₂ Penultimate pecten tooth.

*I. cantator**2. sollicitans*

Antennal ratio, (antenna: midline of head) 1:1.6 to 1:2.1. Antennal tuft double or triple occasionally quadruple; antennal hairs 2 and 4 long, 3 somewhat shorter, 5 and 6 approximately equal. Antenna spiculate.

Terminal Segments: Comb scales five to seven ($\bar{x} = 5.7$), individual scale with long terminal spine followed by spines which are only slightly subequal to one another. Pentad hair 3 longer and stouter than other pentad hairs. Siphon ratio 2.5:1 to 4.0:1. Pecten teeth three to five ($\bar{x} = 4.0$). Siphon hair single. The dorsal preapical bristle fine, one-half to two-thirds as long as the apical pecten tooth. Anal gills short, budlike.

Specimens Examined: A total of 15 specimens was examined. Five of these were reared from eggs of females collected on October 21, 1962 in New Castle (New Castle Co.), Delaware and the other ten from females collected at Little Creek (Kent County), Delaware, October 25, 1962.

Aedes sollicitans (Walker) (Fig. 2)

LITERATURE CITED

Head: Hairs single, upper, lower and postclypeal more or less in a straight line. Antennal ratio 1:1.7 to 1:2.2. Antennal tuft usually double, occasionally triple; antennal hairs 2 and 3 long, 4 shorter usually less than two-thirds the length of 2 and 3; slightly longer than 5. Antenna spiculate.

Terminal Segments: Comb scales four to six ($\bar{x} = 5.3$), individual scale with long terminal spine followed by a series of weaker, shorter spines. Pentad hair 3 longer and stouter than other pentad hairs. Siphon ratio 2:1 to 3:1. Pecten teeth three to six, usually four or five ($\bar{x} = 4.2$). Siphon hair single the dorsal preapical bristle stout, as long or longer than the apical pecten tooth. Anal gills short, budlike.

Specimens Examined: A total of 17 specimens was examined. The females from which the eggs were obtained were collected from three areas in Delaware: Fenwick Island (Sussex County), Dover Air Force Base Firing Range Marsh (Kent County) and Port Mahon (Kent County).

- BOHART, R. R., 1954. Identification of first stage larvae of California *Aedes* (Diptera, Culicidae). Ann. Ent. Soc. Amer. 47: 355-356.
- DODGE, H. R., 1945. Studies upon mosquito larvae. Doctoral Dissertation, Ohio State University. 79 pp. + 15 plates.
- HAEGER, J. S., 1958. The Colonization of *Aedes taeniorhynchus* Wied. (Diptera, Culicidae.) Proc. 45th Mtg. N. J. Mosq. Exterm. Assoc. 80-88.
- MARSHALL, J. F., 1938. The British mosquitoes. Brit. Museum, Oxford Univ. Press, London. xi + 341 pp.
- PRICE, R. D., 1960. Identification of first-instar Aedine mosquito larvae of Minnesota (Diptera: Culicidae). Canadian Ent. 92: 544-560.

Reviews

THE ANTS OF NORTH DAKOTA. By **George C. Wheeler** and **Jeanette Wheeler**. University of North Dakota Press, Grand Forks, N. D. Pp. viii + 326. 1963. Price: \$4.00, postpaid.

According to the preface, "this handbook is intended for anyone interested in the ants of the northern plains, but it is especially designed for amateurs. We hope that it may be of use in high school biology courses. Myrmecologists and biogeographers will be concerned with the ecological and distributional data." These are modest intentions which are more than borne out by the contents. It is far more than a consideration of the ants of one state and may be used with profit by entomologists in general.

The frontispiece is an outline map of the United States with the number of species of ants in each state which are common to it and to North Dakota. For example, of the 83 species in North Dakota 23 are found in California, 16 in Florida and 41 in Pennsylvania. The Wheelers have gone to unusual pains to check the accuracy of their identifications, which have been verified by such authorities as Cole, Creighton, Gregg, Smith and Wilson. They have also amassed such an enormous collection (5000 samples, each consisting of one to thousands of specimens for a total of an estimated half-million ants) that their listing of relative abundance is significant. The most numerous

are in order: *Formica fusca*, *Lasius sitkaensis*, *Tapinoma sessile*, *Lasius crypticus*, *Myrmica americana*, *Lasius neoniger* and *Formica obscuripes*. Thirty-one of the 83 species belong to the genus *Formica*. Situated as it is in the middle of North America, about 22% of the North Dakota ants may be classified as eastern and 29% as western; there are no physiographic barriers to the entrance of species from any direction. The entire fauna has been acquired since the passage of the last ice age (not over 10,000 years ago). Two of the most recent ebbs and flows possibly date from the 1000–1300 A.D. and 1850 A.D. periods, the former a warm period and the latter the end of a cold period. No endemic species have been found or would be expected under the above conditions.

The book is paper bound with a colored photograph of an ant nest in the Western Badlands on the cover. It is printed on excellent paper with clear type and was published under the auspices of the Louis W. and Maud Hill Family Foundation.
—NEAL A. WEBER.

PRACTICAL ENTOMOLOGY, A Guide to Collecting Butterflies, Moths, and other Insects. By **R. L. E. Ford**. Pp. ix + 198, 12 half-tone plates, 36 line drawings. Frederick Warne & Co., London and New York 3.

This is one of the Wayside and Woodland Series, and is especially for those taking up entomology as a hobby. It deals chiefly with Lepidoptera—catching, killing, mounting and storing them—and with breeding the immature stages. Shorter chapters deal with ants and formicaria, captive wasps, and bumble bees.

About collecting nets, we are given the impression that these are a fairly recent invention. Earlier collectors used a "bat fouler" (two curved, hockey-stick-like poles with netting spread between them) and "it was not until about 1890 that a round net appeared in William Watkin's catalogue." This aroused the reviewer's curiosity; surely bag nets are not that recent! Checking back, nets were found described in Vol. 4 of Kirby and Spence (London, 1826) and in Edw. Newman's *Grammar*

of *Entomology* (London, 1835.). In the former there is also a picture of a bag net that is recommended for butterflies. The clap net or bat fouler is also illustrated, however, and is said to be popular. An early American description is found in A. S. Packard's *Guide* (1869), and there is an illustrated advertisement on the back cover of ENTOMOLOGICAL NEWS, Vol. 4, 1893.—R. G. S.

Notes and News

"People and Pesticides." Under this title, Dr. THOMAS A. JUKES, in *Amer. Scientist*, Sept., 1963, pp. 255-61, has epitomized in six pages the great benefits of pesticides: the saving of many millions of lives by control of malaria, typhus, and 28 other diseases, the converting of miasmal marshes into prosperous farmlands, and the possibility of providing food for an exploding population. And in regard to birds, published records appear to show an astonishing increase in numbers of robins, which along with certain game birds are not harmed by diets heavily spiked with DDT. "The transmission of avian diseases, including fowlpox and Newcastle disease, by mosquitoes, raises the question of possible protective effects on wild birds resulting from the spraying of marshlands with insecticides. The red-winged blackbird, a denizen of marshes, jumped in the Audubon Christmas Bird Counts from 1.4 million in 1940 to 20 million in 1950."

To correct the distorted picture that has gotten abroad more attention should be called to the benefits of insecticides, and more complete studies made of their effects on wildlife. "The issue is not one that merely involves 2% of the sales of the chemical industry; at stake is no less than the protection of the free world from hunger and disease."—R. G. S.

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at \$1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (*Citronella* ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address:

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 Race Street, Philadelphia 3, Pennsylvania

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and *Aedes aegypti* and *Culex quinquefasciatus*

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.

Have you paid your subscription?

January and subsequent issues for 1964 positively
not mailed unless subscription has been paid.

ENTOMOLOGICAL NEWS

DECEMBER 1963

Vol. LXXIV

No. 10

CONTENTS

Emerson and Stojanovich—Two new species of Mallophaga . . .	261
Crabill— <i>Australiophilus ferrugineus</i> (Hutton)	265
Brown—Review: Guide to the manuscript collections in the Academy of Natural Sciences of Philadelphia	274
Indexes and Title Page to Volume LXXIV	277

**PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.**

AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: personal, \$6.00; institutional, \$9.00.
Second-class postage paid at Lancaster, Pa.

ENTOMOLOGICAL NEWS

Edited, 1911-1944, by PHILIP P. CALVERT (1871-1961)

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

R. G. SCHMIEDER, Editor. Editorial Staff: H. W. ALLEN, H. J. GRANT, JR., M. E. PHILLIPS, J. A. G. REHN, and S. S. ROBACK.

SUBSCRIPTIONS: Communications and remittances to be addressed to **Entomological News**, 1900 Race Street, Philadelphia 3, Pa.

Prices per yearly volume of 10 numbers.

Private subscriptions, for personal use, domestic and foreign, \$6.00 postpaid.

Institutional subscriptions, for libraries, laboratories, etc., domestic and foreign, \$9.00 postpaid.

ADVERTISEMENTS: Rate schedules available from the editor.

MANUSCRIPTS and all communications concerning same should be addressed to R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4 × 6 inches. All blocks will be sent to authors after printing.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Separates (as reprints with extraneous matter removed) may be obtained only from the printer at the prices quoted below. Authors must place their orders for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Effective March 1963 issue.

Copies	1-4 pp.	5-8 pp.	9-12 pp.	Covers
50	\$5.87	\$ 9.40	\$14.69	\$6.40
100	7.03	11.15	17.62	8.75
Add'l 100	2.35	3.51	5.85	4.70

Plates printed one side: First 50, \$4.68; Additional 100's, \$3.52.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXXIV

DECEMBER, 1963

No. 10

Two New Species Mallophaga from Asia

K. C. EMERSON, Stillwater, Oklahoma

and

CHESTER J. STOJANOVICH, U. S. Public Health Service
Communicable Disease Center, Atlanta, Georgia

In collections of Asian Mallophaga submitted to the authors for identification were two new species which are herewith described and illustrated.

Menopon kuntzi n. sp.

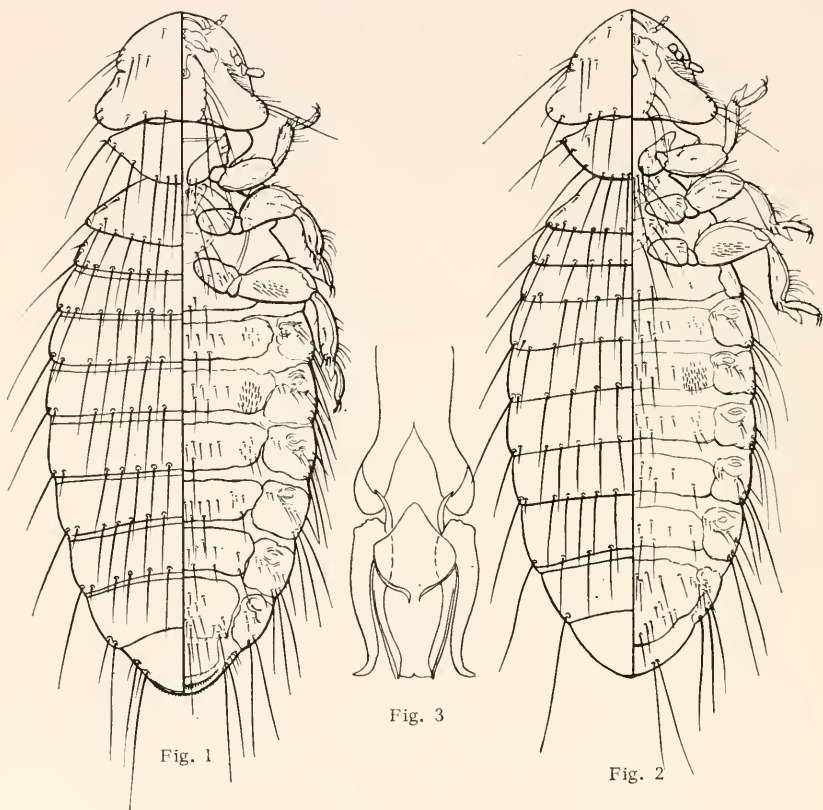
Male. External morphology and chaetotaxy as shown in Fig. 2. Genitalia (less sac) as shown in Fig. 3. Total length is 2.06 mm.

Female. External morphology and chaetotaxy as shown in Fig. 1. Total length is 2.10 mm.

Discussion. The previously known species of *Menopon* were reviewed by Emerson in 1954. In that review, the male genitalia of each species was illustrated. The male genitalia of *M. kuntzi* n. sp. differs radically from those of all known species, but is closest to the group containing *M. gallinae*, *M. interpositum*, *M. pallens* and *M. subgallinae*. The parnera with outward curved, pointed distal tips are distinctive, as are the slender, pointed distal tips of the endomera. The terminal abdominal segment of the female is more broadly rounded than in other known species, and the setae of the anal fringe are shorter than in other known species.

Type host. *Bambusicola thoracica conorivox* Gould, 1863.

Type material. *Holotype* male, *allotype* female and thirty *paratypes* collected from several localities on FORMOSA in 1959, 1960 and 1961 by Dr. Robert E. Kuntz. *Holotype* is deposited in the U. S. National Museum.



***Menopon kuntzi* n. sp.**

Menopon kuntzi, new species. FIG. 1.—Dorsal-ventral view of female. FIG. 2.—Dorsal-ventral view of male. FIG. 3.—Male genitalia.

***Amyrsidea elbeli* n. sp.**

Male. External morphology and chaetotaxy as shown in Fig. 5. Genitalia (less sac) as shown in Fig. 6. Total length is 2.16 mm.

Female. External morphology and chaetotaxy as shown in Fig. 4. Total length is 2.20 mm.

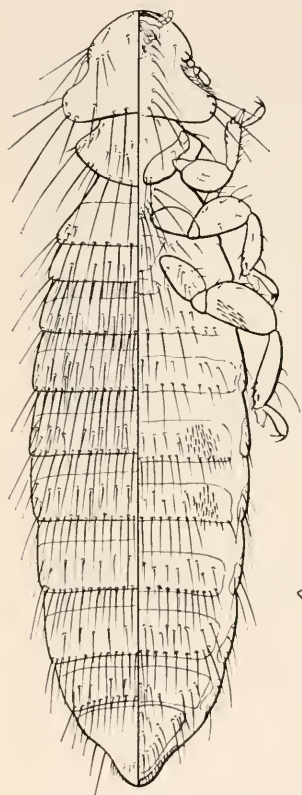


Fig. 4

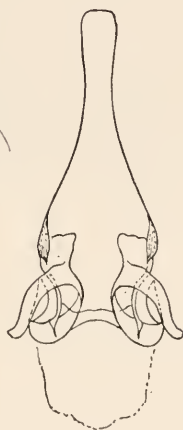


Fig. 6

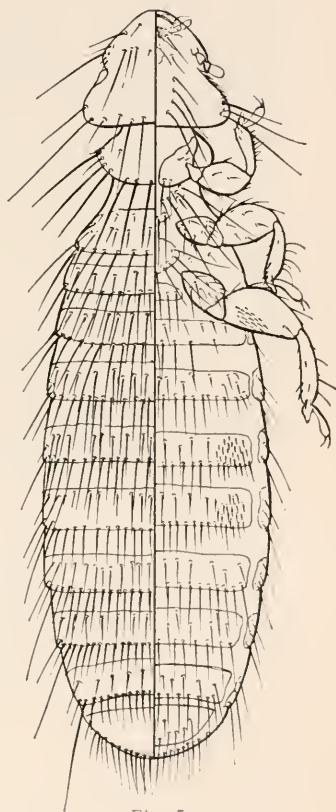


Fig. 5

***Amyrsidea elbeli* n. sp.**

Amyrsidea elbeli, new species. FIG. 4.—Dorsal-ventral view of female. FIG. 5.—Dorsal-ventral view of male. FIG. 6.—Male genitalia.

Discussion. The genus *Amyrsidea* contains many diverse groups. Carriker in 1954 discussed several of these groups and included excellent illustrations and a discussion of *A. ventralis*, the genotype. *A. elbeli* is closest to *A. ventralis*, the two differing considerably from other species in the genus. *A. elbeli*, in both sexes, is much larger than *A. ventralis*. A small brush of setae is present in each posterior lateral angle of abdominal sternite VI in *A. ventralis* and none are present in those locations in *A. elbeli*. The paramera of the male genitalia of *A. ventralis* are longer than in *A. elbeli*, and possess a sharp hook on the distal end which is not true of *A. elbeli*. The terminal abdominal segment of the female of *A. ventralis* has eight heavy spines on the posterior margin, and does not have a well-defined anal fringe. In *A. elbeli*, the female has an anal fringe, and the posterior margin of the terminal abdominal segment is without heavy spines.

Type host: *Arborophila brunneopectus erythrophrys* Sharp, 1890.

Type material: *Holotype* male, *allotype* female and twenty *paratypes* collected at Trus Modi, Mt. Pampang, NORTH BORNEO on 19 July 1953 by Robert E. Elbel. Holotype is deposited in the U. S. National Museum.

LITERATURE CITED

- CARRIKER, M. A. 1954. The Menoponidae of the Cracidae and the genus *Odontophorus* (Neotropical Mallophaga Miscellany No. 8). *Novedades Colombianas* 1: 19-31.
- EMERSON, K. C. 1954. Review of the genus *Menopon* Nitzsch, 1818 (Mallophaga). *Ann. Mag. Nat. Hist.* (12), 7: 225-232.

A New Interpretation and Redescription of a
Bizarre New Zealand Centipede, *Australiophilus ferrugineus* (Hutton)¹ (Chilopoda: Geophilomorpha: Geophilidae)

R. E. CRABILL, JR., Smithsonian Institution,
U. S. National Museum, Washington, D. C.

In 1877 F. W. Hutton described a new geophilomorph, *Himantarium ferrugineum*,² from Wellington and Otago, New Zealand. The description is short and in many ways imprecise. None the less he did mention several characters which, we know now, signalize one New Zealand chilopod that is notably different from all the rest: "Body composed of about 110 segments [the known specimens have from 95 to 109 leg-bearing segments], which retain nearly the same breadth throughout. Basal article [coxopleuron] of the last pair of legs deeply and coarsely punctate [porous], both above and below. . . . Length 4.3 inches [about 109 mm] . . ."

In 1891³ R. I. Pocock redescribed *ferrugineum* but as a new species, *Geophilus huttoni*. Having referred *ferrugineus* to *Geophilus*, Pocock was obliged to propose a new species name in order to avoid the creation of a secondary homonym, since a *Geophilus ferrugineus* had already been described by C. L. Koch in 1835. Pocock based his description upon a female, 118 mm long, consisting of 109 pedal segments, which had been acquired from the Otago Museum (British Museum accession number 86-119). Since Hutton's type or types had been deposited in the Otago Museum, and inasmuch as the species is evidently very rare in collections, it is not unreasonable to suspect that

¹ This study was undertaken with the aid of a grant from the National Science Foundation. For their assistance and the use of specimens in their collections I wish to express my thanks to the following persons: Dr. G. Owen Evans and his colleagues, British Museum (Natural History), London; Mr. M. P. Johns, Christchurch, New Zealand; Dr. Wolfgang Engelhardt, Zoologische Sammlung des Bayerischen Staates, Munich.

² Ann. Mag. Nat. Hist. (4) 20, p. 115.

³ Ann. Mag. Nat. Hist. (6) 8, p. 223.

Pocock's specimen was one of the series upon which Hutton had originally founded *ferrugineum*. Available records, unfortunately, do not positively confirm this possibility.

In his monograph on the Geophilomorpha⁴ Attems was uncertain as to the generic and suprageneric allocation of the Hutton species; however, he did assign it provisionally and uncertainly to the Gonibregmatidae.

The first real insight into the problem of the species' true nature and categorical affiliation was gained by Archey, who re-described it very briefly in 1936,⁵ recognized its obvious affinities with *Zelanophilus provocator* (Pocock), and assigned it to *Zelanophilus* of which *provocator* is the type-species: *provocator* is known only from New Zealand. Archey based his redescription upon one, very old and damaged specimen without accompanying locality data, but he reported that its label was in Hutton's own handwriting. If the specimen was not one of the original Hutton types, then at least it had been identified as *ferrugineum* by Hutton.

The conclusions and information that I shall present at this time are drawn from all of this and some other published material as well as from my recent study of two specimens: Pocock's holotype of *huttoni*, from Wellington, New Zealand (a type locality of *ferrugineum*), which I have examined in the British Museum (Natural History); one male specimen recently sent to me for identification by Mr. P. M. Johns of Christchurch. This latter specimen is described in detail at the end of this paper.

These specimens are unquestionably conspecific with each other and with the specimen that Archey studied; moreover, in the light of all of the evidence it seems virtually certain that they must be conspecific with the material upon which Hutton based *ferrugineum*. Furthermore, it seems highly probable that *Geophilus polyporus* Haase, 1887,⁶ from D'Urville Island, New Zealand, is a junior synonym of *ferrugineum* (New Synonymy). In 1891 (*supra*, p. 224) Pocock recognized the

⁴ Das Tierreich, Lief. 52, p. 343, 1929.

⁵ Rec. Auckland Inst. Mus., 2, p. 52.

⁶ Abh. Mus. Dresden, 5, p. 110.

similarity of his *huttoni*, then new, to *polyporus* but suggested them to be different species on the basis of a prehensorial character, which I find in this case to be unconvincing. Unfortunately, Haase's type was reportedly lost during World War II.

Without question there is much to favor Archey's assignment of *ferrugineum* to *Zelanophilus*; however, as I shall attempt to show, *provocator* and *ferrugineum* differ in a number of notable and, I suspect, generic-level features. As to the latter, admittedly the whole generic section of which *Zelanophilus* and *Australiophilus* are members has never been really exhaustively analyzed on a comparative, structural point-for-point basis, and it cannot be, given the poverty of known species and the extreme rarity of specimens available for study. Therefore my conclusions here must be tentative. Furthermore, in light of the existing knowledge of this complex, from the purely pragmatic standpoint of generic and species identification and with zoogeographic considerations in mind, it seems desirable, at least for the time-being, to assign the Hutton species to *Australiophilus* rather than to *Zelanophilus*.

The following significant characters are common to *Zelanophilus provocator* and *Australiophilus ferrugineus*: (1) Each paraclypeal suture passes toward the middle, not the outer end, of each labral fulcrum. (2) Prelabral setae normally present. (3) Clypeal fenestra (clypeal area) absent. (4) Dorsal surfaces of first maxillary telopodites and medial lobes densely, finely setose. (5) Second maxillae: claw bristled (hispidate); post-maxillary sclerites extensive and passing mesoanteriorially to metameric pore opening; telopodite robust, articles inflated; isthmus very shallow anteroposterially, continuous without division, suture or diastema. (6) Labral sidepieces with anterior alae well-developed; labral fulcrum massive and strongly oblique. (7) Mandibular teeth weakly but distinctly heterogenous. (8) Anterior parungues of pretarsi normal in size, not hypertrophied. (9) Sternite: Paxillae absent; on anterior third of body each sternite with a deep anterocentral fovea; porefields on anterior part of body prominent and extensive, those of rear part of body double, widely separated; as the terminal segments gradually

lose their porefields, they gain a very dense vestiture of fine, short setae. (10) Coxopleuron greatly inflated, its pores opening freely on all surfaces, not cavitate. (11) Ultimate leg with two tarsal articles; pretarsus strongly unguiform. (12) Gonopods of males and females each bipartite and separated from each other, *i.e.*, each gonopod is independent and not fused with its companion-gonopod. (13) Anal pores present.

The two species differ notably in the following characteristics.

Zelanophilus provocator: (1) Prelabral plagulae (smooth areas) present. (2) Each labral sidepiece with just one row of filaments, as is the case in nearly all Geophilomorpha; anterior alae separated from clypeus by a very prominent suture. (3) Pleurograms (chitin lines) of prosternum short and abortive, concursive with pleuroprosternal sutures. (4) Trochanteroprefemur with a prominent mesodistal denticle. (5) On anterior part of body each porefield narrowly divided by a longitudinal sulcus; thus the anterior porefields are double. (6) Ultimate pretergite wider than preceding or succeeding tergites. (7) Coxopleuron not extending forward beyond rear margin of penultimate pedal segment (as seen from dorsal aspect).

Australiophilus ferrugineus: (1) Prelabral plagulae absent. (2) Each labral sidepiece with many rows of filaments, a very uncommon condition in the Geophilomorpha; anterior alae fused with clypeus without intervening suture. (3) Pleurograms of prosternum relatively long and distinctly digressive from the pleuroprosternal sutures. (4) Trochanteroprefemur entirely without denticle. (5) On anterior part of body each porefield is single and continuous across its sternite; there is no dividing sulcus. (6) Ultimate pretergite much narrower than preceding tergite but as wide as succeeding tergite. (7) Coxopleuron much more inflated than in *provocator* and extending well forward of rear margin of penultimate pedal segment to encroach upon its stigmopleurite.

It is my present belief that the Hutton species is preferably referable to Verhoeff's Australian genus *Australiophilus*,⁷ whose only known species, *longissimus* Verhoeff (*supra*, p. 52), is

⁷ Arkiv för Zoologi, 17A(3), p. 51, 1925.

known from Herberton, Queensland. The holotype is not in the Verhoeff Collection at Munich and was probably lost during the second World War. On the other hand, Verhoeff's description is quite detailed and leads one to the conclusion that *longissimus* and *ferrugineus* are at least congeneric and possibly even conspecific. In both: (1) There is a very high pedal segment number. (2) The prehensors are very broad, robust, and lack the critical mesodistal denticle. (3) The pleurograms of the prosternum are well-developed and very distinctly digressive from the pleuroprosternal sutures. (4) The paraclypeal sutures incomplete and sinuous. All of the foregoing characters link the Hutton and Verhoeff species, at the same time separating them from *provocator*. It must be admitted, however, that all of these species share other characters—some quite remarkable—that argue for a single, broader genus.

Finally, in passing, I wish to stress the fact that all of these species as well as some others from the Indo-Australian region, while differing from each other in various evidently generic-level features, share the hispidate second maxillary claw, the full implications of which are as yet by no means clear. A tentative guess is that this and some other features (*e.g.*, the robust oblique labral fulcra, the prominent postmaxillary sclerites of the second maxillae, the prominent labral anterior alae, the weakly heterogenous teeth of the mandible) could indicate the possibility of their occupying a position annectent between the Geophilidae and the Schendylidae.

The following is a description of the specimen sent me by Mr. P. M. Johns. It has been compared directly with the Pocock specimen in London and agrees with it very closely. I precede it with a chronological synonymy.

***Australiophilus ferrugineus* (Hutton) (New Combination)**

Himantarium ferrugineum Hutton, Ann. Mag. Nat. Hist. (4) 20, p. 115, 1877.

Geophilus polyporus Haase, Abh. Mus. Dresden 5, p. 110, 1887. (New Synonymy.)

Geophilus huttoni Pocock, Ann. Mag. Nat. Hist. (6) 8, p. 223, 1891. (Pocock's redescription of *ferrugineum* to avoid secondary homonymy.)

- Megethmus ferrugineus* (Hutton). Chamberlin, Bull. Mus. Comp. Zool. Harvard 64, p. 63, 1920.
Geophilus huttoni (Hutton). Attems, Das Tierreich, Lief. 52, p. 343, 1929. (Uncertainly referred to Gonibregmatidae.)
Geophilus polyporus Haase. Attems, Das Tierreich, Lief. 52, p. 344, 1929. (Uncertainly referred to Gonibregmatidae.)
Zelanophilus ferrugineus (Hutton). Archey, Rec. Auckland Inst. Mus. 2, p. 52, 1936.

INTRODUCTORY. Male. Locality: New Zealand, D'Urville Island; 23 August 1960; V. Stout, leg. Johns Collection, number 28.

Pedal segments 107. About 85 mm long. Color: Light yellow-brown (evidently discolored in alcohol), the underparts somewhat lighter. Body essentially of uniform width throughout.

ANTENNAE. Distally very slightly attenuate, not flattened. Articles 2-7 filiform, the rest more or less moniliform. Vestiture: From dorsal aspect articles 1-4 sparsely setose, 5 or 6-14 densely and finely setose. Ultimate article on lateral and mesal surfaces with an elongate patch of short, thick, hyaline setae. CEPHALIC PLATE. Very slightly longer than wide. Frontal suture prominent. Paramedial sulci absent. Anterior and posterior corners rounded; sides slightly excurved. Prebasal plate exposed. CLYPEUS. Without fenestra (clypeal area) but anterobilaterally with a large, amorphously lissate area (plagula), this very weak. Anterior to each labral sidepiece without plagula. Anterior half of clypeus densely clothed with short setae; two prelabral setae immediately in front of labral midpiece. Paraclypeal sutures nearly reaching fulcrum, the course of sutures running toward but not meeting approximate center of fulcrum. Each bucca with a plagula adjacent to labral fulcrum; ventral surface without setae. LABRUM. Sidepieces weakly fused with midpiece whose teeth are pigmented, short and strong. Each sidepiece with a weak anterior ala, without suture separating it from clypeus; with 5-7 rows of very long and thin setiform filaments, these imparting to the sidepiece a brush-like appearance. MANDIBLE. Teeth weakly heterogeneous; most of them fine, thin, hairlike, but a few at end of row abruptly longer and more

robust, thereby approximating but not exactly duplicating the schendyliform mandible (*e.g.*, of *Escaryus*). FIRST MAXILLAE. Coxosternum relatively shallow but not divided medially; without lappets. Medial lobes long and triangular, apically pointed. Telopodite weakly bipartite, very long, apically blunt; without lappets. Both telopodites and medial lobes dorsally very densely clothed with short, fine hairs. SECOND MAXILLAE. Isthmus anteroposteriorly very shallow, continuous, without suture, division or diastema. Each coxide posteriorly with a V-shaped, very large postmaxillary sclerite. Telopodite: Prominent dorsal and ventral condyles present; first article slightly longer than the third; second and third articles densely setose; apical claw on distal two-thirds with numerous long bristles arising on all sides (not in 1-2 combs as in schendylids). PREHENSORS. Ungula very weakly pigmented (*cf.* Verhoeff's description of *longissimus*); longer than outside length of trochanteroprefemur; unarmed basally; both dorsal and ventral blades smooth, not serrulate. Poison calyx very long, extending from basal quarter of tarsungula and terminating in extreme upper end of trochanteroprefemur. Intermedial articles without denticles. Trochanteroprefemur very short and broad (much more so than that of *provocator*); entirely without distomesal denticle. PROSTERNUM. Anterior denticles absent. Much wider than long. Pleuroprosternal sutures strongly arched, complete, ending ventrolaterally (*cf.* *provocator* in which they end laterally or even slightly dorsolaterally). Pleurograms (chitin lines) strong, distinctly diverging from pleuroprosternal sutures and passing toward but not meeting condyles. TERGITES. All except the first two or three through the penultimate weakly bisulcate. SPIRACLES. Strongly elliptical. STERNITES. Each wider than long. Carpophagus-structures absent. Sternite of anterior third of body each with a shallow fovea anterocentrally. Setae on most very sparse and short but beginning on 8th from last setae rapidly becoming extremely numerous and short, thus the last 6 very densely clothed with fine, short setae. Ventral porefields: Anterolaterals absent; pro- and metacoxae with only a few scattered pores; posterior porefields present on first sternite

as a continuous band about a third the width of the sternite, thereafter on anterior sternites as a single continuous posterior band essentially transversely elliptical in shape, dividing in two on sternite 41, the two fields thereafter gradually becoming smaller and more widely separated, on sternite 102 becoming abruptly very small, each consisting of 4-5 pores, absent on sternites 103-107, in general the pores vanishing as the setosity of the posterior sternites increases. LEGS. Extremely robust, especially on anterior third to fourth of body; on posterior body gradually becoming longer and less robust. Setae very sparse and short. Pretarsi: claw proper (unguis) extremely robust, short, slightly curved; anterior parungues about $\frac{1}{4}$ - $\frac{1}{5}$ as long as their associated unguis and only slightly longer than posterior parungues. ULTIMATE PEDAL SEGMENT. Pretergite notably much narrower than rear of preceding tergite; entirely without flanking parapretergites, i.e., bilaterally not fissate; posterior margin as wide as ultimate tergite. Ultimate tergite extremely long and narrow, width to length = 1:1.75; sides parallel; anterior and posterior margins essentially straight. Presternite distinctly divided centrally, as wide as anterior margin of ultimate sternite. Sternite length twice its width taken at mid-length; sides slightly convergent posteriorly; rear margin essentially straight; densely, finely setose. Coxopleuron: Greatly inflated; anteriorly extending forward to stigmopleurite of penultimate segment; dorsally and laterally uniformly pierced with

Zelanophilus provocator (Pocock): FIGS. 1-2. *Australiophilus ferrugineus* (Hutton): FIGS. 3-5. FIGS. 3, 5, Johns specimen. FIG. 4, Pocock's holotype of *huttoni* (= *ferrugineus*) in British Museum (Natural History).

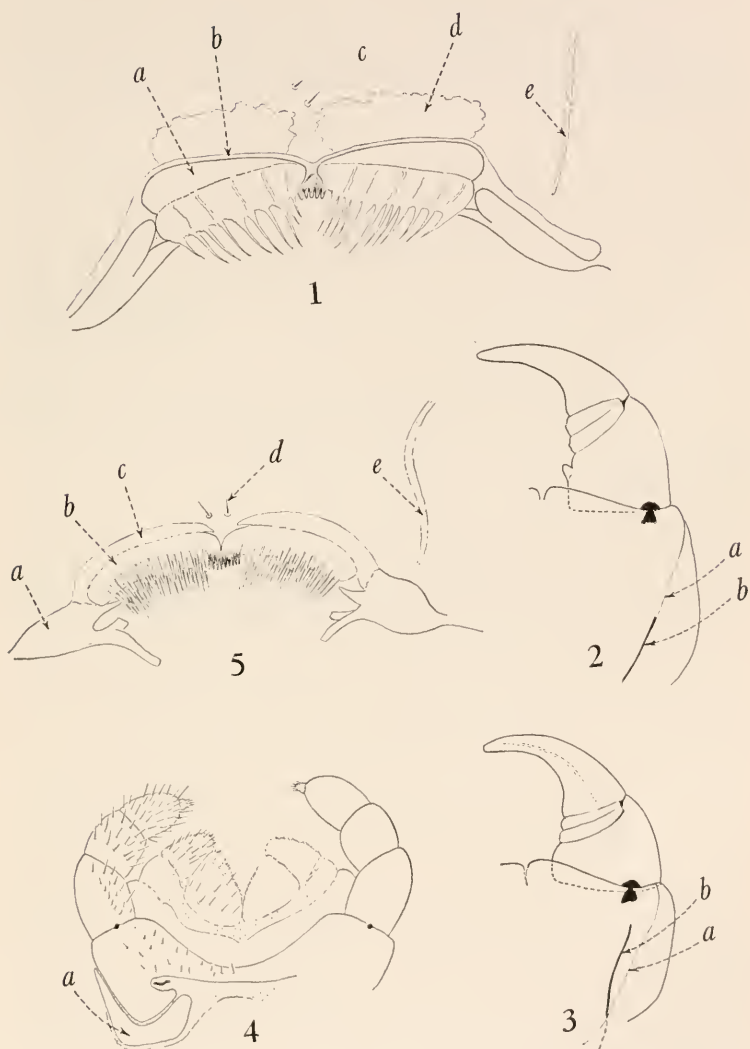
1. Lower clypeus, labrum, labral fulcra. a = anterior ala of right labral sidepiece. b = suture separating ala from clypeal plagula. c = areolate portion of lower clypeus. d = left plagula. e = left paraclypeal suture.

2. Left prehensor and half of prosternum. a = pleuroprosternal suture. b = abortive pleurogram (chitin line) concursive with pleuroprosternal suture.

3. Left prehensor and half of prosternum. a = pleuroprosternal suture. b = well-developed pleurogram, distinctly digressive from pleuroprosternal suture.

4. First and second maxillae (ventral aspect). All setae of right half shown. a = right postmaxillary sclerite.

5. Lower clypeus, labrum, labral fulcra. a = right fulcrum. b = right posterior ala of labral sidepiece. c = right anterior ala of labral sidepiece. d = prelabral setae. e = sinuous left paraclypeal suture.



pores, ventroposteriorly free of pores; with sparse, short setae. Ultimate legs slightly inflated; with short, sparse setae; tarsus bipartite, distal article slightly shorter than the proximal; pretarsus long, robust, unguiform. POSTPEDAL SEGMENTS. Gonopods separated from each other; each distinctly bipartite, the distal article conical. Anal pores large, lateral in position.

Review

GUIDE TO THE MANUSCRIPT COLLECTIONS IN THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA. Compiled by **Venia T. Phillips** and **Maurice E. Phillips**. Special Publication No. 5, Academy of Natural Sciences of Philadelphia. xxvi + 553 pp. 1963. \$7.50. Available from Scientific Publications Dept., Academy of Natural Sciences of Philadelphia, 19th and Parkway, Philadelphia 3, Pennsylvania.

The Academy of Natural Sciences of Philadelphia was founded in 1812. Since that time it has accumulated, in addition to the collections of natural history objects and books related to them, a mass of manuscript material that is fully as valuable as either of the other collections. Until the authors prepared this guide, use of the historic material buried in the manuscript collection was severely curtailed. Eight or ten years ago I was utterly frustrated trying to find evidence of publication dates for the Proceedings of the Entomological Society of Philadelphia. Through the use of the guide in its manuscript form earlier this year, I completed that task with relative ease.

The wealth of material in these archives related to all phases of natural history is unbelievable until seen. The task of organizing some 185,000 items into a workable body for reference could only be done by a person well-versed in natural sciences, history, and library techniques. The Academy of Natural Sciences was most fortunate in having the services of Dr. Venia Phillips for this venture. She has not only produced a service-

able guide but has made the collections quickly available to qualified researchers.

The material preserved in the collections ranges from the correspondence and notebooks of naturalists to the detailed records of the operation of the Academy and of the American Entomological Society. For the entomologist with historical leanings it is an inexhaustible gold mine. The mass of material is divided into 970 collections, each of which bears a serial number. Accounts of the contents of each of these collections constitute the bulk of the Guide. These brief descriptions are prefaced by an alphabetical list of the numbered collections which gives quick reference to the collection number. Following the descriptive portion of the book are two indices, 36 pages of Subject Index and 129 pages of Author Index. Thus there can be a three-pronged attack upon any problem.

The collection contains the archival material of the American Entomological Society and its predecessor, the Entomological Society of Philadelphia. In this group of collections is a mass of unpublished information. There are hundreds of letters from entomologists from all over the world. There is a 66-page typescript history of the Society (Coll. 211). The first three accessions books of the Society's library (Coll. 215) are particularly valuable since they establish approximate dates of publication for many papers in numerous journals now dated with some uncertainty. Four ledgers of membership lists constitute Coll. 218. The minutes of the meetings, from the first (March 1, 1859) to the present are available, except the current volume in the hands of the secretary, as collection 225. Three volumes of records of the publication committee, started in 1861, note the receipt of each article presented for inclusion in the *Proceedings and Transactions* (Coll. 226). The papers of the treasurers (Coll. 253) are not complete but do cover the period to 1876 with no breaks. Collection 492 is of particular interest to the *Entomological News* since it contains over a hundred letters, mostly addressed to Calvert, as editor, and treating of many things including the disposition of type specimens described in the *News*.

There are letters from practically every American entomologist of note over the past 150 years; they reveal much of the unpublished history of American Entomology. A randomly picked example to show what may be found is that of the late Frank Morton Jones. His biological correspondence of 1,470 items is collection 565. His correspondence with Dr. A. E. Brower and with C. P. Kimball, each numbering hundreds of letters are separate collections, 561 and 563, respectively. In Coll. 562 and 564 are other Jonesiana, including his uninterrupted journal of field work started in 1882 and terminated in 1959. A glance at the Author Index shows that there are additional letters from Jones to be found in four other collections.

The material index in the Guide is by no means restricted to entomology. I have elected to comment on that field only because this is an entomological journal. Malacologists, ornithologists, botanists, and a host of others specializing in the field of natural history will find the Guide a key to a treasure trove.

In the arrangement of the body of the book I have only a minor criticism that I believe valid. It would have been convenient to the users if the collection numbers had been included in the running head of each page. The position of these numbers at the lower right of each description somewhat obscures them. The user would have quicker reference if these numbers introduced the title of each collection. The mechanics of preparing such a guide to so large a collection of papers precludes simultaneous numbering and alphabetization. The random treatment of the original material with each collection allotted a serial number is the approved technique for a work such as this.

The Academy and the authors are to be heartily congratulated for conceiving and producing this index to one of the great collections of historic material, a collection that tells the story of the development of the natural sciences in America from the beginning of the Nineteenth Century to the present day.

F. MARTIN BROWN

INDEX TO VOLUME LXXIV

(* Indicates new genera, names, etc.)

ALEXANDER, C. P. New exotic crane-flies (Tipulidae: Diptera). Part VII	99
ALLEN, H. W. Two new species of Paratiphia (Tiphidae: Hymenoptera) from the western United States	219
ARNAUD, P. H., JR. Records of Diptera from Guadalupe Island, Mexico. Second Paper	117
(See also under Sabrosky)	
BETREM, J. G. A new Neotropical subgenus of Campsommeris (Hymenoptera: Scoliidae)	70
BROWN, F. M. A neotype for Coenonympha ochracea Edwards (1861)	211
Review: Guide to the manuscript collections in the Academy of Natural Sciences of Philadelphia	274
CHAMBERLIN, R. V. Further observations on the chilopod genus Tomotaenia	88
CHAPMAN, Q. L. (See under Froeschner, R. C.)	
CHEMSAK, J. A. and E. G. LINSLEY A new genus and two new species of Mexican Elaphidionini (Coleoptera: Cerambycidae)	85
CLENCH, H. K. Further notes on West African Lycaenidae (Lepidoptera)	43
COOK, D. R. Omartacaridae, a new family of water mites from the ground waters of North America	37
Studies on the phreaticolous water mites of North America: New or unreported genera of Mideopsoidea and Acalyptonotoidea	63
CRABILL, R. E., JR. A new interpretation and redescription of a bizarre New Zealand Centipede, Australiophilus ferrugineus (Hutton) (Chilopoda: Geophilomorpha: Geophilidae)	265

EADES, D. C. Observations on <i>Charilaus</i> and <i>Charalainae</i> (Orthoptera: Pamphagidae)	131
EMERSON, K. C. and C. J. STOJANOVICH Two new species of Mallophaga from Asia	261
ENGELMANN, M. D. A constant pressure respirometer for small arthropods	181
EVANS, H. E. Notes on the prey and nesting behavior of some solitary wasps of Jackson Hole, Wyoming	233
FOX, R. M. Arthur Ward Lindsey	134
FROESCHNER, R. C. and Q. L. CHAPMAN A South American cydnid, <i>Scaptocoris castaneus</i> Perty, established in the United States (Hemiptera: Cydnidae)	95
GILLASPY, J. E. The identity of <i>Stictiella corniculata</i> Mickel (Sphecidae: Bembicini), with a note on synonymy in <i>Stictiella</i>	251
Two new genera and a new species of Bembicini (Sphecidae) from North America, with a key to the genera having recessed ocelli	187
HIGGINS, H. H. and T. A. WOOLLEY New species of moss mites of the genus <i>Eupterotegeus</i> from the western United States (Oribatei: Cepheidae)	3
HUBBARD, C. A. Some summer, fall and winter fleas from northeastern Tanganyika	153
HULL, F. M. A new species of <i>Laphystia</i> Loew (Diptera: Asilidae)	202
ISAKSON, O. W. (See under LaBerge, W. E.)	
KROMBEIN, K. V. A new <i>Chrysura</i> from Plummer's Island Maryland. (Hymenoptera: Chrydidae)	149
A new <i>Nitelopterus</i> from Wyoming and Washington (Hymenoptera: Sphecidae)	61
A new <i>Tachysphex</i> from southeastern United States. (Hymenoptera: Sphecidae)	177
Behavioral notes on a Floridian mantid, <i>Gonatista grisea</i> (F.) (Orthoptera: Mantidae)	1
LABERGE, W. E. Review: The nest architecture of the sweat bees	137

LABERGE, W. E. and ISAKSON, O. W. The nest of <i>Lasioglossum</i> (<i>Chloralictus</i>) <i>zephyrus</i> (Smith) in Wyoming (Hymenoptera: Halictidae)	113
LAKE, R. W. Descriptions of first instar larvae of <i>Aedes cantator</i> (Coquillett) and <i>Aedes sollicitans</i> (Walker)	253
LINSLEY, E. G. (See under Chemsak, J. A.)	
McDERMOTT, F. A. Frank Morton Jones (1869-1962)	29
MOXEY, C. F. Two new species of Coleoptera (Scarabaeidae: Coprini)	24
MUCHMORE, W. B. Two European Arachnids new to the United States	208
MUESEBECK, C. F. W. Six new reared species of Bracon (Hymenoptera: Braconidae)	157
PILLAI, P. R. P. and P. W. WINSTON A preliminary study of the Acaridae (Acarina, Sarcoptiformia) of Colorado	49
PORTER, C. C. Some new locality records for the social wasp <i>Polistes exclamans</i> Viereck (Hymenoptera: Vespidae)	176
The rediscovery of <i>Listrognathus nubilipennis</i> (Cresson) (Hymenoptera: Ichneumonidae)	19
RAPP, W. F., JR. Notes on Naucoridae (Hemiptera) ..	129
REINHARD, H. J. Correction (<i>Golcondamyia</i> , Tachinidae)	152
New American Sarcophagidae (Diptera)	75
RICHARDS, A. G. Giant sperm in the cockroach, <i>Periplaneta americana</i>	57
The effect of temperature on wing-beat frequency in the male of the cockroach, <i>Periplaneta americana</i>	91
ROBACK, S. S. Nematode parasites of Pelopiinae (Diptera: Tendipedidae)	143
New Neotropical Coelotanypus (Diptera: Tendipedidae Pelopiinae)	169
Review: The mosquitoes of the South Pacific	26
SABROSKY, C. W. and P. H. ARNAUD, JR. A holotype problem and a new specific name in <i>Pseudochaeta</i> (Diptera: Tachinidae)	155

SCHMIEDER, R. G. Notes and News: People and pesticides	259
Notes and News: Robert E. Snodgrass	166
Review: To know a fly	167
Review: Guide to insects of Connecticut	231
Review: Practical entomology	258
Review: Ticks and disease	139
SCHMITT, J. B. Robert Evans Snodgrass (1875-1962)	141
SCOTT, H. G. The Collembola of New Mexico IX. Entomobryinae: Drepanura, Entomobryoides, Isotobryoides, Sinella	9
X. Entomobryinae: Drepanocyrtus, Willowsia, Lepidocyrtus, Pseudosinella	225
XI. Entomobrya, Orchesella, Lepidocyrtinus	243
Collembola of Oregon. II	107
STOJANOVICH, C. J. (See under Emerson, K. C.)	
WALDBAUER, G. P. Crepuscular flower visits of adult Volucella vesicularia Curran (Diptera: Syrphidae) ...	135
WALKLEY, L. M. A second reddish Dusona from the Nearctic Region (Hymenoptera: Ichneumonidae)	239
WALLACE, G. John Ridgeway Bowman (1910-1962) ..	142
WILLEY, R. B. and R. L. WILLEY Range extension of Colorado Cyphoderris (Orthoptera: Prophalangopsidae)	200
WEBER, N. A. Argentine myrmecology	205
Review: The ants of North Dakota	257
WINSTON, P. W. (See under Pillai, P. R. P.)	
WOOLLEY, T. A. (See under Higgins, H. G.)	
WRAY, D. L. Larval rash of the American dagger moth Acronycta americana Harr. (Lepidoptera: Phalaenidae)	72

GENERAL SUBJECTS

Academy of Natural Science manuscript collections	274
American Entomological Society Legacy from F. M. Jones	203
Transactions, reprints of ...	167
Argentine myrmecology	205
Behavior of mantid	1
Behavior of solitary wasps ..	233
Bibliography of F. M. Jones	32
Birds and pesticides	259
<i>Campsomeris</i> , biology of	21
Crepuscular flower visits of <i>Volucella</i> (Syrphidae)	135
Dagger moth, rash caused by larval hairs	72
European arachnids in U. S.	207
Nematode parasites	143
Nomenclature Notice ...	55, 224
Pesticides	259
Respirometer for arthropods ..	181
Sperm, giant, in <i>Periplaneta</i> ..	57
Temperature and wing-beat frequency in the cockroach	91

OBITUARIES

Bowman, J. R.	142
Jones, F. M.	29
Lindsey, A. W.	134
Snodgrass, R. E.	141, 166

PERSONALS

Gressitt, J. L.	166
Simeone, J. B.	24

REVIEWS

Arthur: Ticks and disease ...	139
Ball and Anderson: Taxonomy and speciation of <i>Pseudo-</i> <i>phonus</i>	139

Belkin: Mosquitoes of the South Pacific	26
Cook, Alexander, and Nowell: Guide to the insects of Con- necticut Part VI	231
Dethier: To know a fly	167
Ford: Practical entomology ..	258
Jukes: People and pesticides	259
Kira and Umesao (ed.): Na- ture and Life in Southeast Asia	98
Leonard: A list of aphids of New York	138
Phillips and Phillips: Guide to the manuscript collections in the Academy of Natural Sci- ence of Philadelphia	274
Sakagami and Michener: Nest architecture of the sweat bees	137
Wheeler and Wheeler: The ants of North Dakota	257

GEOGRAPHICAL
DISTRIBUTION

Arizona: Dipt. 76, 79, 202; Hym.	158, 187
Baja California: Hym.	192
California, Dipt. 81; Hym. 164,	221
Colorado: Acar.	5
Florida: Hym.	159, 240
Formosa: Malloph.	261
Guadalupe Is.: Dipt.	117
India: Col. 25; Dipt.	103
Jamaica: Dipt.	174
Kansas: Dipt.	78
Maryland: Hym.	150
Mexico: Col. 85; Collem. ...	9
Nevada: Dipt.	83
New Mexico: Collem. 9, 225,	243
North Borneo: Malloph.	263
North Carolina: Hym.	177
Oklahoma: Acar.	37

Oregon: Collem. 107; Hym. . .	161
South Carolina: Hemip. 95; Hym.	162
Surinam: Dipt.	170, 172
Upper Burma: Col.	26
Utah: Acar.	8
Washington: Hym. . . .	61, 222
West Africa: Lep.	43
West Indies: Dipt.	80
Wyoming: Acarina 64; Hym. 61	

COLEOPTERA

<i>auricomis</i> ,* <i>Pseudaneflus</i> * . . .	86
<i>fraterculus</i> , <i>Acanthoscelides</i> . .	164
<i>grandis</i> , <i>Anthonomus</i>	162
<i>neglectus</i> ,* <i>Copris</i>	25
<i>Pseudaneflus</i> *	85
<i>Pseudophonus</i> , book on	139
<i>puncticollis</i> ,* <i>Pseudaneflus</i> * . .	87
<i>zymoticus</i> ,* <i>Onthophagus</i> . . .	26

DIPTERA

<i>agni</i> ,* <i>Hexatoma</i>	100
<i>amoenis</i> ,* <i>Coelotanytus</i>	172
<i>arenicola</i> ,* <i>Senotaenia</i>	77
<i>argentifrons</i> , <i>Pseudochaeta</i> . . .	155
Blepharoceridae of Connecticut	231
<i>caesia</i> ,* <i>Euphytomina</i>	78
<i>canadensis</i> , <i>Pseudochaeta</i> . . .	155
<i>cantator</i> , <i>Aedes</i> , larvae	253
<i>cletis</i> ,* <i>Coelotanytus</i>	174
<i>Colcondamyia</i> * (Tachinidae)	82, 152
Crepuscular syrphid	135
Culicidae, book review	26
<i>culiciformis</i> , <i>Procladius</i>	148
Deuterophlebiidae of Connecticut	231
Diptera of Connecticut, Pt. VI	231
Dixiidae of Connecticut	231
<i>falcifera</i> ,* <i>Colcondamyia</i> * . . .	82
<i>feris</i> ,* <i>Coelotanytus</i>	169
<i>Golcondamyia</i>	152

<i>gracilis</i> , <i>Bironella</i>	224
Guadalupe Island, list of Diptera	117
<i>guadalupensis</i> ,* <i>Blaesoxipha</i> . .	124
<i>homochrou</i> ,* <i>Hexatoma</i>	101
Hyperoesclidae of Connecticut	231
<i>illinoensis</i> , <i>Pentaneura</i>	144
<i>kinnara</i> ,* <i>Hexatoma</i>	99
<i>micidus</i> ,* <i>Opsidiotrophus</i> * . . .	80
<i>mikirensis</i> ,* <i>Hexatoma</i>	103
<i>naelis</i> ,* <i>Coelotanytus</i>	170
Nematodes on Tendipedidae . .	148
<i>Opsidiotrophus</i> * (Tachinidae)	80
<i>pusillus</i> , <i>Procladius</i>	145
<i>rudra</i> ,* <i>Hexatoma</i>	104
<i>scapularis</i> , <i>Coelotanytus</i>	148
Scatopsidae of Connecticut . . .	231
<i>sillersi</i> ,* <i>Laphystia</i>	202
<i>sollicitans</i> , <i>Aedes</i> , larvae	253
Tendipedidae, Parasites of . . .	142
<i>triflora</i> ,* <i>Hexatoma</i>	105
<i>triloris</i> ,* <i>Erucophaga</i>	75
<i>vesicularia</i> , <i>Volucella</i>	135
<i>vittata</i> ,* <i>Obsidia</i>	79

HEMIPTERA

<i>castaneus</i> , <i>Scaptocoris</i>	95
Heteroptera	98
<i>mormon</i> , <i>Ambrysus</i>	129
<i>rostrata</i> , <i>Aelia</i>	55

HOMOPTERA

Aphids, list of New York . . .	138
<i>Chermes</i>	224
<i>Enlachnus</i>	224
<i>Pemphigus</i>	224
<i>Psylla</i>	224

HYMENOPTERA

<i>abbreviatus</i> , <i>Janus</i>	165
<i>acrobasis</i> ,* <i>Bracon</i>	158
<i>agathymi</i> ,* <i>Bracon</i>	157

<i>angularis</i> , <i>Pompilus</i>	239
Ants, book on	257
<i>asotinae</i> ,* <i>Paratyphia</i>	222
Behavior of solitary wasps ..	233
<i>boharti</i> ,* <i>Tachysphex</i>	177
<i>bruchivorus</i> ,* <i>Bracon</i>	162
<i>corniculata</i> , <i>Stictiella</i>	251
<i>evansi</i> ,* <i>Nitelopecterus</i> ...	61, 234
<i>exclamans</i> , <i>Polistes</i>	176
<i>ferruginea</i> ,* <i>Dusona</i>	240
<i>gossypi</i> ,* <i>Bracon</i>	161
Halictidae, book on	137
<i>jani</i> ,* <i>Bracon</i>	164
<i>kyrae</i> ,* <i>Chrysura</i>	150
<i>longilabris</i> ,* <i>Xerostictia</i>	187
<i>longilabris boharti</i> ,* <i>Xerostictia</i>	192
<i>Microstictia</i> *	196
<i>montana</i> , <i>Dryudella</i>	236
<i>Mymar</i>	224
Myrmecology, Argentine	205
<i>nubilipennis</i> , <i>Listrognathus</i> ..	19
<i>nubilosa</i> ,* <i>Stictiella</i>	252
<i>occidentalis</i> , <i>Pompilus</i>	239
<i>pilosa</i> , <i>Ammophila</i>	238
<i>plumipes</i> , <i>Campsomeris</i>	21
<i>quinquenotatus</i> , <i>Episyron</i>	238
<i>Rhynchium</i>	224
<i>robusta</i> , <i>Podalonia</i>	237
<i>rosaceani</i> ,* <i>Bracon</i>	160
<i>Stictiella</i> synonymy	251
<i>tenebrica</i> , <i>Campsomeris</i>	72
<i>Tenebromeris</i> * (<i>Scoliidae</i>) ..	72
<i>Tetrastichus</i>	55
<i>verna</i> ,* <i>Paratyphia</i>	219
<i>Xerostictia</i> *	187
<i>Xylocopa</i>	224
<i>zephyrus</i> , <i>Lasioglossum</i> , nest	
of	113

LEPIDOPTERA

<i>americana</i> , <i>Acronycta</i>	72
<i>aryxna</i> , <i>Agathymus</i>	158
<i>caryae</i> , <i>Acrobasis</i>	160

<i>caryivorella</i> , <i>Acrobasis</i>	160
<i>chapini chapini</i> , <i>Aphnaeus</i> ...	45
<i>chapini occidentalis</i> , <i>Aphnaeus</i>	46
<i>chapini ugandae</i> , <i>Aphnaeus</i> ..	45
<i>comptoniella</i> , <i>Acrobasis</i>	160
Hesperiidae of Japan	98
<i>itura</i> , <i>Anthene</i>	48
<i>leononia paradoxa</i> , <i>Spindasis</i> ..	43
Lycaenidae, Japanese	98
Lycaenidae, West African ...	43
<i>mcalspini</i> , <i>Agathymus</i>	158
<i>neumoegeni</i> , <i>Agathymus</i>	158
<i>ochracea</i> , <i>Coenonympha</i> for of-	
ficial list	211
<i>paludicola</i> , <i>Cupidesthes</i>	46
Psychidae, publications of F.	
M. Jones	32
Rash caused by larval hairs ..	72
<i>rosaceanus</i> , <i>Archips</i>	161
<i>rubricincta</i> , <i>Anthene</i>	47

ORTHOPTERA

<i>americana</i> , <i>Periplaneta</i> ...	57, 91
Behavior of mantid	1
<i>carinatus</i> , <i>Charilaus</i>	131
Charilainae, position of	131
<i>grisea</i> , <i>Gonatista</i>	1
<i>monstrata</i> , <i>Cyphoderris</i>	200
Pamphagidae	133
Phasmidae	55

SMALLER ORDERS

<i>annulicornuta</i> ,* <i>Drepanura</i>	
(Collem.)	11
Collembola of New Mexico	
9, 225, 243	
Collembola of Oregon	107
<i>Ctenophthalamus</i> (<i>Siphon</i> .) ..	224
<i>Drepanocyrtus</i> , key (Collem.)	225
<i>Drepanura</i> (Collem.) key ...	10
<i>elbeli</i> ,* <i>Amyrsidea</i> (Malloph.)	263
<i>Entomobrya</i> (Collem.) key ..	243
Entomobryinae (Collem.), key	9

Entomobryoides key (Collem.)	14
Fleas from Tanganyika	155
<i>kuntzi</i> ,* <i>Menopon</i> (Malloph.)	261
<i>Lepidocyrtinus</i> (Collem.)	250
<i>Lepidocyrtus</i> (Collem.), key	227
<i>neomexicana</i> ,* <i>Drepanura</i> (Collem.)	12
<i>Orchesella</i> (Collem.) key	247
<i>Pseudosinella</i> (Collem.) key	229
<i>rubra</i> ,* <i>Orchesella</i> (Collem.)	249
<i>socorrensis</i> ,* <i>Drepanura</i> (Collem.)	12
<i>Spinifacies</i> * (Collem.)	108
<i>Willowsia</i> (Sira) (Collem.)	
key	226

NON-HEXAPODA

ARACHNIDA

ACARINA

<i>anomalus</i> , <i>Caloglyphus</i>	52
<i>berlesei</i> , <i>Caloglyphus</i>	51
<i>destructor</i> , <i>Glycyphagus</i>	53
<i>dimidiatus</i> , <i>Tyrophagus</i>	50
<i>elongatus</i> ,* <i>Omartacarus</i>	38
<i>eremitus</i> ,* <i>Chappuisides</i>	65
<i>feroniarum</i> , <i>Histiostoma</i>	54
<i>imamurai</i> ,* <i>Uchidastygacarus</i>	66
<i>longior</i> , <i>Tyrophagus</i>	50
<i>mideopsoides</i> ,* <i>Yachastia</i> *	64
<i>Omartacaridae</i> * (new family)	37
<i>Omartacarus</i> *	38
<i>palmarum</i> , <i>Tyrophagus</i>	51

<i>putrescentiae</i> , <i>Tyrophagus</i>	49
<i>rostratus</i> ,* <i>Eupterotegeus</i>	3
<i>spinatus</i> ,* <i>Eupterotegeus</i>	5
<i>talpa</i> , <i>Schwiebia</i>	53
Ticks and disease, book on	139
<i>Yachastia</i> *	63

ARANEAE

<i>Dictyna</i> sp. as prey	237
----------------------------	-----

OPILIONES

<i>tricarinatus</i> , <i>Trogulus</i>	208
---------------------------------------	-----

PSEUDOSCORPIONES

<i>lubricus</i> , <i>Roncus</i>	210
---------------------------------	-----

CHILOPODA

GEOPHILOMORPHA

<i>epileptica</i> , <i>Tomotaenia</i>	89
<i>ferrugineus</i> , <i>Zelanophilus</i>	266
<i>Paraplanes</i>	88
<i>parviceps</i> , <i>Tomotaenia</i>	89

NON-ARTHROPODA

Nematoda on Diptera	143
---------------------	-----

AVES

<i>brunneopectus erythrophrys</i> , <i>Arborophila</i>	264
<i>thoracica conorivox</i> , <i>Bambusi-</i> <i>cola</i>	261

Memoirs of the American Entomological Society

An irregular serial, containing monographic papers by students of authority in their respective subjects. Seventeen numbers have been published to date and publication of number 18 will occur on May 31, 1963. Cost of individual numbers varies from \$2.00 to \$15.00. Complete sets are still available for \$85.00 (17 numbers in 18 volumes).

For price lists and titles address :

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 Race Street, Philadelphia 3, Pennsylvania

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and Aedes aegypti and Culex quinquefasciata

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, \$2.00 U. S. Currency. Foreign Delivery \$2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus *Bucculatrix* treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

Price \$8.50

THE AMERICAN ENTOMOLOGICAL
SOCIETY

1900 Race Street, Philadelphia 3, Penna., U.S.A.



THE  BOUND TO PLEASE

Heckman Bindery INC.

 **JAN. 65**
N. MANCHESTER,
INDIANA

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00844 5603